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EDITORIAL NOTES.

The Report and Accounts of the Gaslight and Coke Company.

THE usual preliminary statement relating to the results of the past half-year's working of the Gaslight and Coke Company, which conveyed the unwelcome intimation that the Directors can only recommend a dividend on the ordinary stock at the reduced rate of 4 per cent. per annum, carrying forward £68,165, has prepared the proprietors and also the public for a disappointing report and revenue account. Indeed, the nature of the announcement is such as to restrict interest in the statements now offered and those that may be forthcoming next Friday, on the occasion of the general meeting, to the allied questions, "What does it mean?" and "How has it come about?" On the face of it, the fact is that the dividend has come down to the equivalent of a bare 10 per cent. under the old dispensation, though the selling price of gas would warrant the payment of an additional sliding-scale dividend of 2¼ per cent., making 12¼ per cent. in all on the unconverted stock. Besides, the carry-forward, which a year ago was £221,570, has been reduced to the figure already given. The worst mischief is that, as the report confesses, notwithstanding the reduction in price by 5d. per 1000 cubic feet, there was a falling off in the quantity of gas sold by 82 million cubic feet, or ¾ per cent. As usual, "the weather" is accused of causing this decline, in face of which the Directors have taken the step, which the report dignifies by the name of "policy," of "foregoing the "exercise of the Company's full rights under the sliding-"scale clauses on this exceptional occasion." Policy! What is gained by refraining from owning to want of the requisite funds?

How much better it would have been had the Board shown themselves as politic in refraining from dividing up to the hilt on previous occasions, when the profit had not been earned, is left to be surmised. The present state of things is only what the administration have been preparing for years, in defiance of precise and reiterated warnings. It is none the pleasanter to contemplate for that. At last the optimistic Board have been brought face to face with the truth that business cannot be made by a mere turn of the hand at the Horseferry Road. The sliding scale, which the Governor used to say he should never hesitate to put into operation, by raising the price of gas when the Board wanted more revenue, has proved a delusion and a snare; and the Company are once more, after so many fat years, down to the old maximum dividend of the years before 1876. The consumption of gas has decreased—not by a large percentage, but at any rate by the amount of the annual output of a fair-sized gas-works. To judge by the capital account, moreover, this falling off would have been larger but for the continual growth of population on the outer fringe, needing fresh capital expenditure to supply it. The Directors do not deem it worth while to mention in the report their belated adoption of the plan of maintaining incandescent burners, which has been understood to signify their conversion to the "forward "policy" in gas supply. It is a spiritless report altogether, for the circumstances of the undertaking. The only matters mentioned with any suggestion of satisfaction are that the new coal and oil contracts are on terms "slightly more "favourable to the Company than those of last year;" and that the site of the Pimlico works has been sold, and the amount realized placed to the credit of the capital account. The whole of the authorized capital has been issued, and there is a balance in hand of £905,881, which may be supposed to be intended to keep the undertaking going as long as it will, since there is no mention of another application to Parliament. But there is plenty of time for this between now and November.

The revenue account shows a reduction of income from gas, due chiefly to the lower price, of from £1,821,966 to £1,593,587. Residuals are sadly diminished in value; coke having dropped from £408,617 to £263,714. Tar has also fallen from £66,462 to £54,699. Ammonia is a bright spot, having improved from £68,563 to £84,093. Altogether, the revenue from residuals is down from £556,813 to £415,335. On the other side of the account, the cost of the materials of gas manufacture shows a remarkable shrinkage from £1,159,913 in the corresponding half of 1901, to £744,068. All the other charges are reduced, bringing down the cost of gas manufacture from £1,631,395 to £1,148,566. The other entries do not call for comment, except that for rates and taxes, which are up again by about £7000—an almost ludicrous point in the circumstances. The net result is a profit balance of £504,922, compared with £413,704 a year ago. On this distinctly improved showing alone, some proprietors might wonder why they are asked to accept a reduced dividend. They are told that this is "policy." This might have been the proper word to use for such a course, if taken at a period when there was an alternative. Now it is not policy, but necessity; for the till is all but empty. The detailed accounts do not suggest much fresh criticism. The quantity of unaccounted-for gas has gone up, possibly owing to the prevalence of street pavement disturbances and tramway works. The temporary loan has ceased to appear in the balance-sheet; and on the other side of the account the Company have £425,000 on deposit at interest. The various stores in hand are considerably attenuated from the values assigned to them at this time last year. The outstanding balance on the automatic meter supplies fittings account has been reduced from £195,945 to £134,147. There is no indication anywhere in these accounts of whether or not this business is still going on, and if so to what extent.

Here we must leave these accounts and the report, and wait for the address of the Governor, Colonel Makins, on Friday, to further elucidate the situation. The working for the past half year seems to show that the undertaking just pays 4 per cent., which is the equivalent of the old maximum dividends, on the capital stock, with a selling price for 16-candle gas of 3s. per 1000 cubic feet, irrespective of the cheaper sales in the southern district and all that this obligation entails. This result may or may not be reliable as a datum; but it is certainly something to be noted, if only as a round figure easy to be borne in the memory.

The Meeting of the North British Association.

ANOTHER circle of the hand of Time, and the great event of the year in the life of the gas manager in the North (and his wife) has come and gone. The members of the North British Association met in force in Perth last Thursday. After a cordial greeting from the head of the Corporation, appropriately habited in his scarlet and ermine robes of office, they sat in deliberative council on affairs connected with the gas industry. They visited the new gas-works, where they saw a charmingly set illustration, in solid form, of the triumph of mind over matter. Thereafter, joined by their lady friends, they dined in the company of the magistracy. At eventide, they worshipped the venerable at the Palace of Scone, where, in ancient times, Scottish Coronations were wont to be made. Nor was the plum cake yet completed; for, resting overnight in the Fair City, they betook themselves next morning to the pleasant town of Crieff, and there, in the gardens of Drummond Castle, they admired the beauties of Nature in floral groves which, in gaudiness, almost rivalled the millinery of the ladies. Then, after a heartily enjoyed meal, they dispersed and descended into the workaday world, where they will struggle with recalcitrant minerals, importunate workmen, exacting employers, pushing contractors, and clamorous customers, till the revolving season again calls them up to the high place to enjoy that meed of bliss which comes to them for two days only out of the whole 365.

His must be a poor intellect indeed which could not extract from all this study of the scientific, the mechanical, the antiquarian, the social, and the natural worlds, some element of joy to brighten life withal, or find, in one or other

of the objects reviewed, some new truths wherewith to arm himself for work. These varied pursuits are not intended as a delirious round of sight-seeing; and it is according to observation that they are not so regarded. The variety of the fare is the charm of the North British meetings. This year's gathering (as indicated above) was full to repletion with good things. In the technical department, with which alone we are concerned, there is room for nothing but gratification. There were no "cloud-capped towers" to be rapturously looked up to; and there were no tottering theoretic campaniles which required to be propped up from below. But there was an average of merit which would have done credit to a more pretentious body. The President, Mr. John Wilson, of Tradeston, contented himself with putting on record a narrative of the progress of the works he is in charge of, and their present attainments—a useful record, giving to plodding managers in the country, insight into the ways by which great gas-works are built up and carried on. Then he wisely confined himself to the duties of the Chair, and allowed the meeting to conduct its business. It was in every way becoming, in view of the visit to the Perth Corporation Gas-Works, that the first place on the list of technical communications should be given to Mr. W. B. M'Lusky, the energetic Engineer and Manager of the works. Mr. M'Lusky took advantage of so excellent an opportunity to describe some new plant which he is proposing to erect, with regard to the efficiency of which, when completed, there was unanimous assent. The discussion brought into prominence the wonderful variety of detail, not only which is possible, but which is necessary, in the adaptation of principles once laid down. This is a phase of the service that Associations like this render to the gas industry which is becoming increasingly apparent. One man discovers a principle, and others, in adapting it to their individual requirements, work it out in details not originally thought of. The size of flues differs in arrangements for the carbonization of different coal; and even the shape of a brick is of moment.

Probably it was not the intention of the Committee to arrange the papers in the order of sequence which would be followed by a lecture upon the processes in the production of gas; yet that was the actual order in which the papers before the meeting were read. Having discussed retort-house arrangements, they passed on to condensation, and then to purification—Mr. W. Currie, of Alexandria, taking up the one, and Mr. T. Lighbody, of Renfrew, the other. Both were the outcome of practical experiment, and were not essays on problematics. Therein lay their instructive value. Out of the discussion upon condensation came the truth that what is good for one works is not beneficial in another greater or less in size; but the further truth was not touched upon, that apparatus which is good for one coal may not suit another. There would seem to be room for investigation upon this point. Mr. Lighbody's paper bade fair to raise, in acute form, the old question of the utility of purification by oxide of iron—certainly a highly debateable subject in the North. A few years ago it was all but accepted in Scotland that oxide was not required in Scotch works, and certainly that it was not a suitable agent to employ in small gas-works. The subject was before the Association at Ayr in 1897; and then the only advocate of it was the reader of the paper—the late Mr. D. M. Nelson, of Glasgow—himself a vendor of the material. All the other speakers, including the then President, tabooed it except under special circumstances. Time—even the short time since then—has brought about a change. On Thursday there was only one speaker who regarded oxide as an unsatisfactory material to employ in the purification of gas; and that was Mr. J. Kincaid, of Falkirk, who said he had had to give it up. Oxide, it is evident, is again becoming fashionable in Scotland. In connection with this discussion there was a very happy interpolation by Mr. F. Brincker, of Rotterdam, who has a chemical knowledge of the subject not possessed by any of the members. His remarks are worth study. They formed, in fact, the gem of the meeting. It is safe to say that they will prove exceedingly useful to a great many.

The Association is being well supported by its members. Some representatives from Edinburgh and Glasgow took an active part in the business. There were also present members from such distant places as Inverness in the north and Stranraer in the south. The manager of the large works and the manager of the small works met on an equality; but the benefit was to the latter, as the subjects discussed were far more suited for small than for large works, and the small manager necessarily learned from the large one. It is not always so; for sometimes the large manager is absent, and sometimes when he is present his observations are over the heads of his smaller brethren. On this occasion there was no trace of that. The smaller managers were favoured with the presence and the co-operation of the men in charge of the largest works. The result was a harmonious and useful meeting. One personal matter was dealt with: Since the last meeting of the Association the Secretary and Treasurer—Mr. R. S. Carlow—has retired from the post of Gas Manager at Arbroath, and has started in business. The question arose whether he could retain his offices in the Association. To get out of the difficulty, the Association were asked by the Committee to alter one of the rules, by adding to it that the Secretary and Treasurer need not be a member of it. This was agreed to unanimously, and Mr. Carlow, who has now been Secretary and Treasurer for fifteen years, was unanimously re-elected. The step is a new departure in the matter of such appointments, as it had never been the practice to have a trader present in the inner circle, when affairs, it may be, affecting trade, are being discussed. The arrangement was made out of good will for Mr. Carlow; and the probability is that he is the only outsider who will ever hold the office.

Trade Union Members of Parliament.

THE position of affairs in regard to the election of a successor to Sir Ughtred Kay-Shuttleworth in the representation of the Clitheroe Division of Lancashire, redirects attention to a non-party question of politics that is of very considerable importance. That is the question of whether we are to have in future in the House of Commons, as the Trade Unions—or, rather, their leaders—desire that we should have, a number of members elected to carry on the business of the nation, not with a view to the best interests of the whole community (as estimated by a majority of the electorate throughout the country for the time being), but in accordance with the policy, and in furtherance of the interests, of one particular section of a class of the community, namely, the Trade Unionist section. The evils involved in such sectional representation are most serious. In the first place, even assuming—what is not true—that Trade Union members would be representative of the working classes as a whole, it will be a bad day for this country when labour and capital are specifically arrayed against one another in Parliament, as the Union leaders seek to array them in every-day affairs, and when the working men everywhere are taught to believe that no one out of fustian considers their welfare or deals justly by them when matters touching that welfare are before the Legislature.

The great need of the future is the consolidation of the interests of capital and labour, to the achievement of which the persuasion of the men to the belief that those interests are coincident is essential; and the preaching of the doctrine that labour can only be represented adequately in Parliament by Trade Unionists runs counter absolutely to such persuasion. Many years ago, the Rev. Frederick Denison Maurice—a true friend of the working man—protested eloquently against "labour" newspapers, as having an influence contrary to the best interests of the labouring classes, tending as they do to implant in the minds of their readers the idea that their employers are their enemies, and because such papers, being dependent for their financial success upon pleasing the working man, inevitably always present to him the side of every question which will please him most and be most flattering to his vanity and sense of importance, rather than the true facts of the case, which may be unpalatable. Such a protest is needed equally against "labour" members of Parliament. The member who is elected solely to further the interests of the Trade Unionist section of the working classes is, in the first place, very often least able to discern what does really make for the ultimate advancement of those interests and what does not—being, in the nature of things, more likely to favour measures more immediately beneficial but ultimately harmful, than others not so obviously, but in the opinion of those able to take "long views" certain to be eventually, profitable, to the working classes. In the second place, the member elected on a sectional instead of a national programme would carry least weight with the rest of the House when questions affecting that section arise. Whenever Parliament suspects a member of subordinating the good of the country to the benefit of his particular class, it discounts

his opinion very heavily. When the coal tax was imposed last year, what importance did the House set upon the wailings of the colliery-owning members? And when the Workmen's Compensation Act was under discussion, did the employer whose anxiety for his pocket was plainly greater than his desire to do justice, carry much weight?

What the Trade Unionist looks at is the fact that Parliament contains so many brewers, so many landlords, so many manufacturers, so many coalowners—in short, representatives of almost every section of the capitalist classes; but what he forgets is that these members are not elected as brewers, landlords, manufacturers, and so on, but, speaking generally, as men qualified by education, experience, and character to make and administer laws for the community at large, and that the members are answerable to their constituents—comprising in many cases a large majority of working men—for all their actions in Parliament. The idea that working-class interests are ignored by the House of Commons, owing to the absence of any but one or two "labour" members, cannot survive a consideration of the measures passed by the House in the last thirty years. There is, rather, only too good reason sometimes to think that fear of the labour vote in the constituency leads capitalist members to favour Socialistic measures in Parliament.

Working men who, like Mr. Thomas Burt, have earned the esteem of their fellow-men by uprightness of character, shrewdness, and intellect, and who, commanding a majority in a constituency by reason of that fact, are elected as being men best fitted to carry on the country's business, will always be welcomed in Parliament, and can do much useful work there. But for the Trade Union official, elected by Trade Unionists to serve Trade Unionist ends first and their country a long way after, are emphatically not wanted at Westminster; and we hope that neither political party will make it easy for them to find their way into the councils of the nation. Unfortunately, at Clitheroe, that is just what they are doing.

Peace with Profit.

When commenting on the report of the Welsbach Incandescent Gas-Light Company a fortnight ago, we remarked upon the evidence it furnished of the intention of the new Board to thoroughly grapple with what at one time appeared to be an almost hopeless situation; but if a doubt should still remain in the mind of anyone on this point, it will be dispelled on a study of the statesmanlike speech delivered by the Chairman (Mr. Edgar Williamson) at the annual meeting of the Company last week. Much of what he had to say was, of course, in the nature of ancient history; but in endeavouring to estimate the probable effects of the changes that have been brought about, it is necessary to keep well in mind the condition of affairs which previously existed. A gigantic effort has been, and is being, made by the new Board of Directors to stem the tide of destruction which a twelvemonth ago threatened to overwhelm the Company; and the proprietors, after being commiserated with on having sunk their capital in such an unfortunate venture, are to be congratulated on the fact that men so capable as those now at the helm have been found willing to devote their time and experience to the heavy task they have undertaken. The words at the head of this article—"Peace with Profit"—constitute the essence of the policy of the new management, as contrasted with the old Board's policy (if their performances justify so dignified a term) of "War with no Com- "promise." That is to say, everything possible will now be done to conciliate the Company's customers and to avoid unnecessary litigation, which is a complete change about from the old order of things. We gather, however, that anyone who confuses this with a "Peace at any Price" policy is likely to receive a rude awakening; for the utterances of the Chairman afford no ground for the belief that the Company will not take the necessary steps to protect their licencees from being prejudiced by the actions of those who may remain outside the agreement arrived at. Indeed, the success of the whole scheme would seem to require that this should be done—and done effectually. Otherwise, as one of the speakers remarked at the meeting, if the licencees see people all round them selling mantles without making any payment to the Company, they will be asking: "Why should I pay a royalty when others do not?"

The tale unfolded by Mr. Williamson last Tuesday amply justifies the Welsbach Company in taking a foremost place among the many limited liability company scandals that have of late dealt such severe blows to the investing public. Successful as the new Board may be in putting the undertaking on a sound commercial basis, they can never hope to make it represent anything approaching the amount at which it is capitalized. That is beyond the bounds of possibility. Whatever the true value of the business was at the time of the incorporation of the Company, the course pursued by the old Directors constituted a veritable "Rake's "Progress;" and, in the light of subsequent events, we can quite sympathize with General Russell in his regret that he was persuaded to withdraw the motion he brought forward two years ago for the appointment of a Committee to investigate the affairs of the undertaking. Had he pressed his proposal at that time, a valuable twelve months might have been saved. Some of the instances quoted by Mr. Williamson (in the course of his speech of over an hour's duration) of the "policy" of the evicted Board, were almost incredible; but it says a great deal for the tone of the meeting that, instead of arousing wrath, the recital of them merely succeeded in evoking loud laughter on the part of many who must have been very heavy losers by the terrific fall which has taken place in the Company's stocks. The feeling dominating those present was one of absolute confidence in the men who are now at the head of affairs; and that this confidence was, and is, fully warranted, we should be the last to question. They cannot, of course, perform miracles; but what is humanly possible they will do.

The next thing that the proprietors will now have to face will be a drastic readjustment of the capital. But this will only affect them nominally; for the amount which will be written off has long been irretrievably lost. Under these circumstances, there will naturally be a strong desire to discover what points of a comforting nature there may be in the statement of affairs placed before the meeting; and we are glad to say this search need not be in vain. First of all, there is the enormous saving—amounting to no less than £46,000—which has already been effected in the expenditure, and the intimation that this figure may even be increased in the future. Then comes the almost phenomenal expansion of trade which, in the short period that has so far elapsed, has accompanied the sweeping changes made by the new Board. The figures with regard to the latter point will be found in the reply of the Chairman to a question asked by a shareholder; and those who study them cannot fail to be satisfied with the progress they indicate. Another stage has been reached in the history of this notorious undertaking; and for the sake of all concerned, we hope that the next chapter may form pleasanter reading than those which have preceded it. As events have proved, it would have been better had the Advisory Committee been appointed earlier; but when they were appointed, they did their work thoroughly well. It remains only for the new Board to efficiently carry out the policy they recommended.

The Socialist View of Profit-Sharing.

It has all along been evident that profit-sharing is disliked by Trade Unions, and it was open to be suspected that where this distaste went beyond any question of immediate pecuniary or personal interest, it would be found to proceed from some Socialistic theory, which, in their usual purblind fashion, British Trade Unionists were applying half consciously. But hitherto there has been no explicit statement of the Socialist view of profit-sharing; or, if such declaration has been made, we have not seen it. The only Socialism there is, of course, is made in Germany. Consequently, it is to Germany that one must look for any formal statement of Socialistic views of industrial developments as they arise. At last we have found such a statement of the true Socialistic doctrine in regard to profit-sharing, in a speech of Herr von Elm, described as a typical German Socialist, at the public meeting in Ardwick, Manchester, last week, inaugurating the International Congress of Co-operators. Profit-sharing is put forward as one of the specific aims of the alliance, or federation, which is six years old and has a large membership; and it was introduced at the opening meeting by Mr. G. J. Holyoake, who spoke warmly in its favour. He spoke of it as the only way of uniting the interest of workpeople with that of their employers; and he concluded by moving a resolution in favour of a propaganda among the private employers. The motion was opposed by Herr von Elm, on the ground that profit-sharing tends to make workmen into selfish individualists and forgetful of the

interests of their class. According to him, workmen have nothing to do with such considerations as personal zeal and interest in the prosperity of their employers, to whom they must apparently ever remain antagonistic so long as such a thing as a private capitalist remains in existence. This is German Idealism in all its glory. It is the direct opposite of the practical wisdom which regards half-a-loaf as better than no bread. These dreamers can see nothing short of a new heaven and a new earth to be worth trying for, or taking upon offer. Their irreconcilability is worth noticing as an indication of the futility of any expectation that they or their disciples among Trade Unionists—who have at least the merit of trying to practice what is preached to them—will ever be satisfied with any concession short of their own desire. Mr. Holyoake's proposal was carried by the thin majority of three votes, which means that it will go no farther.

Meanwhile, it is curious to note that the London County Council must have sat at the feet of Herr Elm or another prophet of the same order some time ago; for they raised before the Parliamentary Committee on the South Metropolitan Gas Bill of 1900 precisely the same objection to the Company's profit-sharing and stock-distributing policy. Anything that tends to make people satisfied with any partial solution of the puzzle of the painful earth short of Collectivism, is not to the taste of Socialists. That is natural enough; but one scarcely expects to have it avowed as a ruling principle of an English local authority. None but a lunatic would aver that it is the ordinary guide of Londoners in the conduct of their affairs. In so far, therefore, as it is the avowed guide of the London County Council, this body does not represent the mind of the Metropolis of the British Empire. So far as the fair fame of profit-sharing is concerned, there is only too much reason to fear that, as a working expedient, it is scarcely withstanding so well as was to have been hoped, the combined influences of apathy on the one hand and the animosity of Trade Unions on the other. The Trade Unionists and Socialists who run the Labour Department of the Board of Trade smugly report the cessation of numerous examples of profit-sharing production; and "Engineering" remarks that, whereas "ten or twelve years "ago profit-sharing was the fashion, to-day it is almost as "dead as the crinoline." This is a flippant way of treating the subject which is not quite worthy of our contemporary; nor is it supported by the facts. Whatever else he may be, Sir Christopher Furness is not ordinarily reputed an antiquated person; and he thinks well enough of profit-sharing to give it another trial in his own shipbuilding firm, on the shareholding basis that Sir George Livesey maintains to be of the essence of a successful scheme of the kind. Casual failures of cash bonus distributing devices do not count for much outside the statistical anthill of the Board of Trade, which gives a comfortable retreat and gentle employment to superannuated labour agitators.

Gas Lighting for Picture Galleries.

The attention of our readers should be directed to the valuable report of Professor Percy F. Frankland on the effect of different artificial lights—electric arc and incandescent gas—on the air of the Birmingham Museum and Art Gallery, which is reproduced in another column. It appears that the Corporation Committee charged with the care of the Art treasures kept in the large room of the Art Gallery, were laudably concerned as to the possible effects of the artificial lighting on the atmosphere of the interior, and consequently upon the pictures exhibited there. The Committee therefore accepted the offer of Professor Frankland to investigate and report on the subject, which he has now done in a manner so thorough as to completely dispel the anxiety naturally felt on this score, and in a sense entirely favourable to the incandescent gas lighting of the gallery. In placing this reassuring judgment upon record, it is only right to give due prominence to the circumstances which contributed to it. The favourable result in regard to the gas lighting is due mainly, if not wholly, to the fact of there being adequate outlet ventilating-shafts immediately over the incandescent burners, designed to remove the products of combustion as formed, and thus prevent their circulation through the atmosphere of the gallery. The only question that presented itself to Professor Frankland, therefore, was whether these shafts really fulfilled the purpose intended. In order to satisfy himself on this point, he took the course of analyzing the atmosphere of the gallery for carbonic acid at different times and under varying conditions of lighting. This indirect method of checking the performance of the ventilating shafts was unexceptionable; but it was also tedious and very troublesome. It incidentally, however, enabled Professor Frankland to lay stress upon the correlative importance of suitable and sufficient inlet ventilation, which appears to have been wanting—that is to say, the air supply of the gallery seems to have been largely drawn from other parts of the interior of the building, instead of from the open air. This defect will probably be repaired; and then the positively beneficial effects of the incandescent gas lighting, as installed in the gallery, will have fair play.

In view of the claims commonly advanced on behalf of electric lighting in respect of its imagined virtue of keeping the air pure, it is important to observe that in this case Professor Frankland condemns the electric arc lighting for not aiding the ventilation of the gallery in any way. On the contrary, when it was employed, the proportion of the indicator of atmospheric impurity – carbonic acid—rose distinctly. Consequently, whatever other deleterious effects are produced by the burning of the carbon arc—and ozone and nitric acid are among them—must remain in the atmosphere; and in the circumstances the system could not be judged desirable. It is unnecessary to overstate the case. It may, of course, be replied that a complete system of ventilation should be competent to remove these deleterious products of electric arc lighting; but this treatment would do the same for gas lighting. The question put to Professor Frankland was not, however, a general one. He had to deal with the facts of a particular example; and nobody can either find fault with his method of treatment or cavil at his conclusions. As a matter of fact, the gas lighting materially assisted the general ventilation of the gallery; and this result is good enough for the responsible custodians of the institution and its contents.

The Royal Assenting of the South Metropolitan, Commercial, and West Ham Gas Bills.

The Royal Assenting of the South Metropolitan, Commercial, and West Ham Gas Bills, recorded in our "Parliamentary Intelligence" this week, converts them into Acts, and thus places in safety the most considerable measures of gas legislation for the year. The circumstance that the London County Council threaten to take the first opportunity for trying to upset the larger of the London Companies' Acts in the important particular of the method of testing the gas for illuminating power, though this was settled in 1900, is a warning against putting too great store on a parliamentary arrangement. At the same time, there is a good deal of force in an accomplished fact, especially when it happens to have a substantial basis of common sense and fairness. It is unnecessary to go over again the points of this particular campaign, as they were thoroughly advertised in these columns at the time. There is a difficulty in the way of discussing the merits of some of them, moreover, since there is no knowing how far off the end of these controversies may still be. If the London County Council can keep the parliamentary ball rolling, so can others. It is not an amusing game for those who have to pay for it; but so long as the County Council are restless, other parties must necessarily remain on the alert. The West Ham Gas Company are not exposed to the tender mercies of the London County Council. There is no reason to suppose that this Company's Act of the present year will be attacked before it again comes up for review in the course of time; and therefore it is quite safe to direct the attention which is due to its importance, to the excellent gas-testing clause of the Act. There is, of course, nothing in this enactment but what is absolutely fair and reasonable; but it has the merit of enshrining this quality in the very best form of words for the purpose to be found in any Act of Parliament. For this reason, the West Ham testing clause will probably be largely copied in future Gas Bills. Reverting for one moment to the Commercial Act, it may perhaps be expedient to point out that the acceptance of a new initial price on the lines of the recommendations of Sir James Rankin's Committee, and a lower standard of illuminating power, do not constitute any abandonment of the general

principle of the integrity of the initial price when once fixed. These recommendations restored at one end of the scale more than they took off at the other; and the question of the amount of the allowance to be made for any reduction of illuminating power remains an open one.

A Big Scheme for Devonport.

On the advice of Messrs. Stevenson and Burstal, the Devonport Corporation have approved of a large scheme for the alteration and extension of the gas-works recently taken over by them. The need for this work was apparent when the Corporation purchased the undertaking; and it is essential for it to be taken in hand forthwith, if they are to properly discharge the duties they have assumed. The estimated cost of the work is no less than £83,000; and adding to this the purchase price of the concern (about £160,000), there will be a future debt of £250,000. On the estimated sale of 276 million cubic feet of gas during the current year, this works out to just over £900 per million cubic feet sold; whereas, Messrs. Stevenson and Burstal point out, the lowest purchases of late years for Companies such as that at Devonport, where the sale has been by arbitration, show a capital fund for the undertakings of over £1200 per million feet. On this basis, therefore, when the extensions are carried out, the Corporation will still have an exceedingly cheap concern, with absolutely new manufacturing works of the most modern type.

The Right to Inspect the Minutes of a Council.

An interesting case was heard at Bootle last week, when the Town Clerk was summoned for a breach of the Municipal Corporations Act, 1882, by refusing to allow a burgess to inspect the minutes of the Council, on his tendering payment of a shilling. It was contended that the Act was mandatory, and imposed a duty; no discretion being left to the Clerk to withhold permission to inspect the documents if he thought fit. The Town Clerk based his right to refuse to show the minutes upon a series of cases which had been decided under similar circumstances; it having been held that when matters were either being contemplated or in actual process of being settled, the persons acting on behalf of the parties were not entitled to see the minutes of the corporation relating to such matters. This is precisely the state of affairs at Bootle. The Corporation are resisting what they believe to be an excessive claim upon them; and the Town Clerk naturally does not want the representatives of the other side to learn what his case is—as they would do if they were permitted to see the minutes, which constitute the instructions given him by the Council. Such an inspection would not be in the interest of the ratepayers; and we are pleased to see that the Bench, relying upon the decisions previously given, upheld the Town Clerk in his refusal to produce the minutes. This is manifestly good sense; but the complainant's Solicitor must have doubts about it being good law, for he promptly asked leave to state a case.

Leaders Who Mislead.

Our old friend Mr. Will Thorne is bestirring himself, in his position as General Secretary of the National Union of Gas Workers and General Labourers, on behalf of the Birmingham and district metal operatives—from which it is pretty safe to infer that trouble threatens the industries concerned. The Union have started a campaign with a view to effectively organizing the men by the end of this year for the purpose of offering resistance to any attempt that may be made to further reduce wages; and in order that lapsed members may be induced to rejoin, the Executive Committee have decided to permit them to do so during this and next month "at the ordinary entrance fee." Such self-sacrificing action on the part of the Union really ought to touch the hearts of the men, if nothing else will. However, the Birmingham metal workers must buy their own experience, as others have had, and will have, to do; and the best we can hope is that the process may not prove to be an unduly expensive one for them. There may or may not be good reason to fear a reduction of wages; but from the fact that at a recent meeting Mr. Thorne found it necessary to argue that the interests of employers and workmen are not, and never can be, identical, it seems the men must have a somewhat weak case. Bearing in mind his intimate acquaintance with the working of one of the most successful profit-sharing schemes in existence, no one can be better aware than Mr. Thorne himself of the fallacy of this contention. The interest of the employer is to make his business prosper; and what greater interest can the workman have than the welfare of the undertaking which provides him with his livelihood? It is not the interests of employers and their men which run in opposite directions, but those of the employers and the Trade Unions, as at present conducted. When masters and men agree, there is no need for a Trade Union.

Workmen's Compensation Act Curiosities.

The stream of more or less ridiculous situations arising from the faulty drafting of the Workmen's Compensation Act appears to be never ending; and last week particulars of an even more than usually absurd case were published in the "Financial Times." A man earning £1 17s. 6d. a week had an accident, and for about two months was absent from his work, during which time he received the statutory half wages. When he resumed work (with the same employers), he unfortunately met with a second disaster about two hours after he had reported himself as on duty, and during which period he had earned something less than 2s. The question arising was, What was the average weekly wage on which compensation should be calculated? The Court of Session, in Edinburgh, have, on appeal, found themselves compelled to solve this problem; and by a majority they have decided that, under the Act, the man is entitled to only 11d. a week—the two hours' pay being held as his "average weekly earnings." It should, however, be pointed out that the Sheriff before whom the case was first tried, and Lord Young in the Court of Appeal, took the view that compensation ought to be at the same rate as before. Our contemporary remarks that if the accident had befallen the man at the end of the first ten minutes after he returned to work, when he had earned but 2d., "the whole legal machinery of Scotland, administering an Act which was produced with a great flourish of trumpets as a sort of working man's Magna Charta, would have solemnly awarded to the victim in the present case the sum of 1d. weekly." The moral drawn from this extraordinary story is that employers should insure under the Act, not necessarily in the offices which charge the lowest premiums, but in those which have a reputation for prompt and reasonable settlement, and so save themselves the annoyance of such quibbling actions as this being brought forward in their names.

WATER AFFAIRS.

The Water Engineers at Leicester.

If the history of the British Association of Water-Works Engineers contains a chapter that outshines all others, it is the one that has been newly added. The members are to be congratulated upon many things in connection with last week's annual gathering, which things formed a combination that could not be unfailing in its production of success. Their choice of Mr. Frederick Griffith, the Leicester Corporation Water Engineer, as President for the year, was a good one; and it almost followed as a natural consequence that this choice would lead to a visit to Leicester, which is a happy resort for professional and technical bodies of all kinds. So it came to pass; and nothing could have been more propitious than that the Mayor for the year should be Mr. Alderman Wood, who, notwithstanding his mayoral burdens, has not forsaken his work as Chairman of the Water Committee, which he has, with indomitable courage and with a high consciousness of duty, constant alike in rough and in smooth seasons, carried on during the past fourteen years, with the President's ten more years' service as Engineer to help him in his onerous task.

The past fourteen years have been years more or less of difficulty in the mater of water supply for Leicester. Alderman Wood found himself called upon to take the responsibilities of the chair of the Department just after the town had had the misfortune to lose, and Loughborough the good fortune to gain, the Blackbrook as a source of supply. Situated in the middle of England amid land used for agriculture and pasturage, with (at the time most required)

nothing more than sluggish streams passing through it, water has been hard to find. And so great trouble came upon Leicester a few years ago owing to drought, and a more rapid increase in population than the best experts of a previous day predicted. Happily, the trouble was tided over; but during the time Alderman Wood had the unenviable task of standing between a population crippled for want of water and a Water Department oppressed by the acts of a power higher than any temporal authority. Then came the great struggle for the Derwent; and the consequent formation of a Water Board which sat as a monument of parliamentary justice to at least three large populations. Alderman Wood is the man in Leicester who has willingly borne the brunt of all these water-supply ups-and-downs; and his kindly nature has found its full recompense in the gratitude of the people and in the pleasure which his love for serving his fellow man has brought him. This, then, was the man who last week told the water engineers assembled in Leicester that the great insight which his work had given him into the anxieties, difficulties, and pleasures of the water engineering profession, and of its all-important and inestimable labour for the communities of the world, had endeared that profession to him above all others. In this we find the secret of the whole-hearted and munificent treatment which he accorded to the members of the Association, to serve and honour whom he confessedly regarded as a personal privilege. Thus it will be through him in the main and through the President, who laboured all the week for success with self-sacrificing persistence in every direction, that the members of the Association will never think of Leicester without the gratifying emotions which memories of kind acts ever stir up in the appreciative heart.

The energy of the Association continues without impair; and, indeed, it is not too much to say that its vital power is visibly improving. New members, a well-maintained tone in the technical contributions to the meetings, and inquiry suggestive and valuable beyond the pale of mere membership, are signs justifying the preceding statement; and there is nothing on the horizon which indicates any possibility of an abatement of activity. The report of the doings of the past week given elsewhere needs only to be perused to find the principal lines of work undertaken and now being vigorously prosecuted. The investigation into the subject of the standardization of cast-iron pipes and the collection of water-works returns are examples; and there are more unlikely things than that the Council will now see fit to look into the question, on behalf of the members, of the standardization of water-fittings, a subject which was ably brought before the meeting by Mr. R. S. Lloyd, M.Inst.C.E., and also into that of the electrolysis of water-mains, upon which an excellent case for some further inquiry was made out by Mr. W. H. Humphreys, of York, as will be seen when the paper is published in an early issue. For much of this diligent usefulness to the water profession on the part of the Association, a full measure of praise must be given to Mr. Percy Griffith, than whom an Association could not have a Secretary more painstaking and exacting in the performance of promise and arrangement.

Of the technical matter presented at the meeting, we have this week little to say in view of the fact that the papers and discussions are not being published in the present issue. It may, however, be said, in regard to the President's address, that it was a chatty and suggestive production; and even in it there is found a hint for further serviceable inquiry. The President has discovered by recent research that there is a great want of uniformity running through the regulations of water authorities; and he is convinced that a lasting service would be conferred on all water authorities if the Association would take the matter into consideration, and draw up a set of standard regulations for the prevention of waste and misuse of water. After consideration by the Association, efforts could be made to secure their legalization. Of course, it would not be wise to overburden the Council nor the Secretary by taking up too many subjects simultaneously; but, at the same time, there are several capable members of the Association, outside the Council, from whom—not having the responsibilities of office—could be drawn Committees who could with advantage take up for examination and report such subjects as the one suggested by the President and that introduced by Mr. Humphreys. It will be found that the lecture by Dr. Priestley contains a special point for the consideration of water engineers; and an examination of other parts of the proceedings reveals the extended interest that is being taken by professional and representative bodies of municipal life in the question of the formation of special controlling authorities for large water areas.

Regarding the papers, there is just one point to which reference may be made. For the first time the papers were taken as read; and no sooner had one discussion ended than another was started. The experience at this meeting does not, however, altogether commend—to us at all events—this new method of procedure. It was perfectly apparent that, although the papers had been circulated by the Secretary in good time, few of the members had digested them, some had paid the authors the questionable compliment of giving their work a cursory review, and other members knew nothing more of the papers than the fact that they were on the subjects specified in the titles. The result was that what was gained in time for discussion was, in certain cases, more than lost by the indigence of the quality. This is a pity. The attempt to get the authors to verbally epitomize their papers was also a failure; and consequently there was little break—excepting in those cases dealt with by the Secretary—between one discussion and the next, and no sufficient introduction. If the system is to be continued, it would perhaps be well for the Council to give preference, in discussions, to those members who sent in their names before a meeting as desiring to speak on given subjects. This would afford the Council some assurance that such members at any rate had been interested in becoming intimate with the paper or papers they named. With this sole and small adverse criticism, we must leave the Leicester meeting, which, it must again be said, will be memorable in the annals of the Association.

The Barnard Castle Swimming-Bath Case.

THE judgment delivered by the Court of Appeal in what will come to be cited as the Barnard Castle swimming-bath case, a report of which will be found elsewhere, is a valuable addition to the recorded judicial *dicta* on one of the most troublesome questions connected with the supply of water. Under the General Act of 1847, every owner and occupier of a dwelling-house may demand from the water company or local authority in his district a supply for "domestic purposes." But as these have not been specifically defined—though the later Act of 1863 excludes certain things from this category—the Courts have been appealed to from time to time to make a pronouncement upon the subject. A case of the kind occurred last August, when Mr. Justice Buckley was asked to decide whether water used in a swimming-bath in the North-Eastern County School at Barnard Castle was supplied for a domestic or a trade purpose, because upon this decision depended the scale on which the charge for it was to be based. His Lordship came to the conclusion that the boys in the school constituted one family, and that the water used for the bath was as much a domestic supply as that employed for culinary and washing purposes. He accordingly decided that the water should be paid for merely on the assessment of the premises, and not at the trade rate. This judgment was appealed against by the Urban District Council, the suppliers of the water, and, as will be seen, with success. The question before the Court really was the object of the swimming bath; and the answer given to it—with, perhaps, a little hesitation on the part of one of the learned Judges—was that it was for the business of the school, and that consequently the water supplied to it was for a business, and not a domestic, purpose, though no profit was derived from carrying it on. The conclusion arrived at by the Court would have been more satisfactory if it had been absolutely unanimous. But Lord Justice Vaughan Williams did not differ so entirely as the other Judges from the view taken by Mr. Justice Buckley on the question of fact. All, however, agreed in this—that their decision must be taken as applicable only to the special circumstances under consideration, and that each case should be judged upon its merits. In other words, the existence of a swimming-bath will not necessarily entail a charge for water on the trade basis. As Lord Justice Romer put it, each case must be considered with some regard to what can reasonably be looked upon as a domestic purpose; and the test of reasonableness should also, he said, be applied to the question of quantity. There must be other establishments in the country, for the rearing and training of the young, similarly equipped to the one at Barnard Castle; and it will be interesting to learn the conditions upon which the supply of water has been furnished to them.

ESSAYS AND REVIEWS.

THE LONDON COUNTY COUNCIL ON CARBURETTED WATER GAS.

In last week's "Journal," there appeared the text of the report of the Public Control Committee of the London County Council on the supply of carburetted water gas by the London Gas Companies, ending with certain recommendations. The report was based upon another report, by the Chemist to the Council, which we also publish in another column, in order that our readers may see how implicitly the Committee have accepted the findings of the Chemist as justifying a formal application to the President of the Board of Trade to promote legislation in the matter next year. It will be as well if, in the interest of the gas industry, threatened with further statutory interference, we devote a little space to criticism of both reports, and endeavour to sketch in outline some of the objections that may be reasonably taken to the conclusions they are made to support. It should be stated that the Chemist's report is published as one of the London County Council's "Red Books;" and it is supplemented by some very voluminous tables, showing the results of daily testings for carbonic oxide of the gas supplied by the Gaslight and Coke and Commercial Gas Companies, between June 1, 1901, and May 16, 1902. These tables cannot be reproduced in the "Journal."

The origin of the action of the London County Council in this matter was the report of the Departmental Committee on the subject, in 1899, which was, of course, regarded by the Council as an invitation to them to take the subject in hand. The present recommendations refer to the Departmental Committee's report; but only mention that it advised the limitation of the proportion of carbonic oxide in the public gas supply at night to 12 per cent., or such greater amount as the Department might consider to be desirable; and also that provision should be made for testing the gas for carbonic oxide. It is now recommended that the enriched gas supply of London should not at any time during the twenty-four hours contain more carbonic oxide than 14 per cent. by volume. That is the sum and substance of the latest suggestion. It is a little more sensible, as such recommendations go, than the pedantic and unworkable proposals of the Departmental Committee; but it would nevertheless, if acted upon, constitute a most obnoxious interference with the liberty of the Gas Companies in the use of an expedient the value of which even the Departmental Committee recognized.

It is impossible to avoid the conclusion that if the recommendations of that Committee had possessed any practical value, action would have been taken upon them before now. It did not take the Government long to deal effectually in the public interest with the trade in calcium carbide; and water gas would have been put under regulation quickly enough if the Committee had had anything sensible to advise on the subject. But, as we pointed out at the time, and as several correspondents amply demonstrated, there was neither justification in fact for such interference with gas manufacturers as the Committee proposed, nor were the proposals themselves workable. On the central point of the whole case which the Committee sought to make out—that the amount of carbonic oxide in a public gas supply should be limited "at night," they shrank from insisting upon their own figure of 12 per cent., and threw the responsibility for fixing the maximum upon "the Department." This being the very thing they were instructed to advise the Department upon, it is no wonder that the whole report fell still-born.

Let us admit here that the London County Council had some justification for volunteering to inquire into the matter themselves, as it affects London. The Departmental Committee expressly made it a question of localities; and it was notorious that the gas supply of London was, as it remains, largely qualified with carburetted water gas in the parts north of the Thames. Therefore, it was reasonable that the London County Council should instruct their Chemist to look into the subject. We have no complaint to make of the style in which the Chemist has performed the task imposed upon him. Of course, he goes out of his way to give a pin-prick to the South Metropolitan Gas Company, in whose gas he finds more carbonic oxide "than is usually found in well-made coal gas." This is the County Council official all over. In regard also to the Chemist's recommendation that the maximum of carbonic oxide in London gas should not exceed at any time during the twenty-four hours 14 per cent. by volume, it is quite the regular laboratory style of disposing of the question. It might be put in this way: Since on a test of illuminating power, gas containing 12 per cent. of carbonic oxide satisfies the statutory requirement, it is fair to allow an additional 2 per cent., making 14 per cent. the maximum, for any time of the day or night.

This view, the liberality of which on the sole datum considered we will not deny, is falsified by the facts of the actual situation. Gas is not supplied to London for the single object of its being tested in the laboratories presided over so ably by Dr. Clowes; but to meet the requirements of the public. The Gas Companies whose production the Chemist has tested, do their work and fulfil their obligations every day to the best of their ability with the means they consider most suitable for the purpose. In the course of their operations, the Gaslight and Coke Company were caught by the Chemist supplying, in 7 per cent. of the samples analyzed, gas containing over 16 per cent. of carbonic oxide. In 94 per cent. of these instances, the content of carbonic oxide was below 16 per cent. (The arithmetic is that of Dr. Clowes.) Sometimes there was no carbonic oxide in the gas at all. Whether sampled by day or by night, there was no difference in the results. It was the same, only more so, with the Commercial gas. On one occasion—dreadful to relate!—the maximum of carbonic oxide ran up to 24·7 per cent., representing about 70 per cent. of carburetted water gas in the mixture.

The response to this statement of the practical person, well aware of the fact that gas supply is a business undertaking, would naturally be the inquiry—"Well, what of it?" Did any deplorable consequences ensue upon this incident of the ordinary, every-day working of the Commercial Gas Company? What did the mortality tables say about it? Because, it is hardly necessary to remark, the real question at issue here is that of the public security. Were it not for the supposed danger of the proceeding to public health, the gas company might send out any kind of gas that would pass the statutory standard. Public security is the only point to be considered. It was the sole care recognized by the Departmental Committee; and even they could not make out that the possible risk was very great. They owned that in the day-time "the amount of carbonic oxide is not of serious consequence." It is therefore reassuring to learn that the single test under notice, which gave such a high reading for carbonic oxide, was made at mid-day on May 16 last, at the Fire Station in Glebe Road, Bow. There is no record of anybody having been hurt. On the previous April 30, the gas at the same place tested 13·6 per cent. of carbonic oxide. Nobody, probably, was the better for the circumstance. If the proposals of the County Council were adopted, the Gas Company would have been penalized for one day, and not for the other, in respect of their endeavour to meet their obligations in the manner that commends itself to the judgment of the Directors and the management.

The Chemist's tests conclusively prove that the fatuous attempt of the Departmental Committee to discriminate between gas supplied by day and by night is as hopeless as expert judgment declared it to be at the time it was promulgated. It appears that whereas the amount of carbonic oxide present in gas may and does vary largely from day to day, it does not (and clearly cannot) alter between a day and a night. We venture to infer that this showing strengthens the argument that the supply of gas is to be regarded from without, as it is dealt with from within, purely as a matter of business. Gas companies do not send out carburetted water gas for fun. In point of fact, it is rather a costly luxury; as every gas manager knows. On the other hand, it possesses advantages of a nature which even the Departmental Committee perceived to be likely to lead to its increased use in certain circumstances. Chief among these is what the Committee called the "emergency value," recognizing that this factor possesses very considerable importance to the general public. Now, it does not need any argument at all to prove that an emergency use of a gas manufacturing process entails the production of the gas in large quantities within a short time. In such an eventuality, the proportion of the "emergency gas" to the remainder must be high; and what then becomes of the limitation which Dr. Clowes, from the serene seclusion of his laboratory, deems pardonable? Again, emergencies are questions of degree. The Commercial Gas Company have been at an emergency for years, due to lack of the necessary capital for enlarging the coal-gas plant. In the circumstances, they went in largely for carburetted water gas, which has a cheaper plant. It does not come well from the London County Council to blame the Company for this, especially seeing that when the Company did apply to Parliament for additional capital, they were bitterly opposed by the Council.

From all this, it can be seen that the question of the amount of carburetted water gas to be allowed by law in a town's supply is not a matter for laboratory determination. To fix such a limit at all, in face of ascertained facts, is to place such a cramping restriction upon the gas industry as nothing less than a vastly preponderating public interest should be allowed to warrant. Where is the evidence of the existence of such a need? Again, to fix a limit is tantamount to total prohibition of the use of carburetted water gas, inasmuch as no such artificial and theoretical maximum as that mentioned by Dr. Clowes could be observed without absolute annihilation of the "emergency value" of the system, which is its chief recommendation. Far better rely upon the play of economic and industrial forces to regulate the gas supply of towns, which it will do more satisfactorily than any Act of Parliament which does not agree with itself. If carburetted water gas is an excessively dangerous commodity, let its manufacture be forbidden altogether. There is no middle way in this regard—between total abolition and leaving its use to the discretion of the gas manufacturers. Dr. Clowes was not asked whether it was dearer than coal gas, or what are the inducements to its employment. In the circumstances, therefore, the eagerness of the Public Control Committee to ask for penal legislation on the subject, is another display of that quality of hare-brained willingness to plunge into parliamentary action on scanty and partial information, which has led the self-sufficient County Council to so many previous parliamentary defeats.

ELECTRIC LIGHTING MEMORANDA.

The Example of Hastings—The Movement in Favour of the Transfer of Provisional Orders from Local Authorities to Contractors—The Three Cornered Controversy over Electric Traction—The Limitations of Street Tramways.

THE observation of the "Electrical Review," that experience of municipal electricity supply is not on the whole encouraging for the once-popular view that this kind of enterprise is likely to prove a valuable asset for ratepayers, is being justified by almost every analysis of the electric lighting accounts of a local authority published. And this in spite of such unworthy expedients for making the best possible showing for the undertaking and casting dust in ratepayers' eyes, as were indicated in Mr. C. F. Botley's letter to the "JOURNAL" last week. It is a coincidence that the same week saw the electric lighting affairs of the Hastings Corporation displayed and criticized—so far as the published accounts enable this to be done—in the "Electrician." Our contemporary confesses that a "cursory glance" at its analysis of the accounts of this undertaking for 1901 "certainly induces a feeling of disappointment." True, it goes on to remark that "a more complete knowledge of the circumstances of the working serves, to some extent, to relieve—but does not wholly extenuate—the indifferent results obtained." This palliative observation seems, by what follows, to apply only to the dearness of coal at Hastings, which is after all a local consideration that must have been present to the mind of the Corporation all along. We venture to think that if our contemporary's knowledge of the conduct of the undertaking had been still more complete—say, in regard to facts and figures as Mr. Botley could make it—the desire to excuse the Corporation would yield to another feeling. About one-third of the revenue from supply is from the public lighting, after nine years' working. There is a deficit on the past year of £3438, as compared with one of £1488 for the previous year. Nothing, of course, is provided for depreciation of a plant which stands the town in £123,406. If it were to be advanced that the whole enterprise is intended for an adornment of the sea-front of the town and as an advertisement, more than for a money-making affair, the reply obviously is that it has been gone about in a very expensive fashion.

On such evidence as the accounts of these municipal electricity supply undertakings afford, it is not wonderful that the movement in favour of the transfer to lessees of local authorities' Provisional Orders not yet put into operation, should be gathering force. It is going on despite the hysterical ravings of professional partisans of the great idea of municipalization, who are chagrined to see so many local authorities concerned rather to escape the risk of increased rates than to commit themselves to the grand "principle" of municipal trading. All the talk in the world will not avail to stem the force of the stream of facts. While acknowledging the indebtedness of the community at large to our leading electrical journals for the useful analyses they publish of the accounts of electricity supply undertakings, we suggest that the information would be made still more interesting if an indication were given of the relative proportions of undertakings to districts. There are large inequalities among these undertakings in respect of capital outlay, units supplied in proportion to the scale of the plant, and so forth. It is difficult to say off-hand what datum might best offer the lacking information as to the extent to which the undertakings meet a public want; but at present there are no means of checking the estimates of sanguine "consultants," who never by any chance admit the possibility of a continuing deficit.

The actual stage of the controversy between the various interests represented by the railways, the tramways, and the free-running public conveyance is highly interesting. Up to the present time, the palm for progress has been claimed for the tramway worked electrically; and but little opposition has been offered to the claim. The popular notion has agreed to this without so much as a suspicion that there could be anything better than the electric tramway. It was assumed to be only a matter of time for this means of transport to run omnibuses off the road; and the electrification of ordinary railways was similarly regarded as a foregone conclusion so soon as a few details should be settled, and the money provided. As usual, however, the unexpected has happened. The favourable impression created by the first well-equipped and appointed electric tramcars that plied on English roads has not been improved upon by ampler experience. As applied in Bristol, and even by the London United Tramways Company in the derelict neighbourhood of Shepherd's Bush, electric tramcars began by making rapid passages, which naturally pleased the wayfaring public and attracted traffic. We believe, however, that to the incessant criticism of this means of transport which has appeared in these pages, is to be attributed the original statement of the great objection to its application to busy thoroughfares which experience is fast justifying. At any rate, we did not copy from anybody our oft-repeated assertion that those who expected great things from electric tramways in the shape of speed, and consequent relief of the congestion of street traffic where this condition prevailed, would be disappointed.

It has all along been our contention that in the absence of a clear course, an electric car cannot run any faster than a horse-car. We have pointed out that for express tramway running it would be necessary to make use of the quiet side streets in busy towns. Practically, this would mean a light railway, with a track reserved to itself; and this is the only condition upon which the electric tramcar can retain the attraction of fast running upon which its popularity depends. When forced to share the common highway, the electric tramway tends to choke itself by the volume of local and subsidiary traffic which it fosters. The result is, that the common horse omnibus ends by overtaking it from point to to point. Some wide-awake electricians have seen this, and have abandoned the idea that tramrails are the last expression of the way to get about popular and growing towns. For owning up to this change of opinion they are, of course, roundly abused by others who are bent upon creating a new vested interest—the interest of the trolley wire. The curious thing about this situation is that the trolley wire tram, while in danger of being beaten by the free-running road vehicle, is cutting seriously into the monopoly of the suburban railways. Mere electrification would not help the latter, because they are tied to their termini and the use of long trains at infrequent intervals of starting to or from the various branches served from the common starting point. A three-cornered competition for traffic thus emerges, the development of which will be replete with interest. Meanwhile, all local authorities owning tramways will be well advised to consider the position with particular care, and above all to remember the motor-car when they are urged to spend vast sums on electric traction. The running costs of motor omnibuses are already below those of most electric tramcars. The revived interest actually being shown in electric traction by accumulators is of a very much healthier and more hopeful kind than the exploded speculations of the Great Horseless Carriage and Electric Cab Companies, who began before they were ready.

TRADE IN THE JUNE HALF YEAR.

THE course of trade during the past six months has not presented any such noteworthy or abnormal features as did several of the half years preceding it. Generally speaking, trade in the home markets has been very fair—neither expanding nor contracting in any marked degree; while foreign trade has been, though not so good as in former years, better than might have been expected six months ago. This has been due to two circumstances—the extremely low level to which freights have sunk, and the remarkably active state of trade in the United States. The home markets, so far as the engineering and allied industries are concerned, have been sustained more firmly than they would otherwise have been by the continuance of activity in the shipbuilding yards, of which the output for the six months (judging by the statistics for Scotland) constitutes a record. Considering the present, and for some time existing, state of the freight market, it is surprising to find that even the fall in the prices of shipbuilding materials should have induced capitalists to provide the means for increasing the already considerable margin of disused ships. It is true that the yards are not now so fully engaged upon orders, but they have sufficient work on hand to prevent any immediate and acute depression. Low freights have had the effect of maintaining the export trade in coal at a level little below that of the record years 1900 and 1901—in fact, the total shipments of coal out of the country during the past half year exceeded all previous records.

		June Half Year.		
		1900.	1901.	1902.
Coal, &c., exported for sale .	Tons.	22,063,206	20,970,197	20,865,973
Coal shipped as "bunkers".	Tons.	5,782,485	6,424,699	7,183,787
Total shipments . .	Tons.	27,845,691	27,394,896	28,049,760
Value of sales		£17,504,764	15,175,399	12,912,877
Realized per ton		15s. 10d.	14s. 6d.	11s. 11d.
Exports of coke (included in above)	Tons.	Not recorded.	368,020	285,929

The following comparison of prices (though only market quotations, which must always be taken with reservation) affords an indication of the condition of the coal, coke, and freight markets now as contrasted with the beginning of this year and with the end of the June half of 1901. The quotations are taken from the "Colliery Guardian."

	Price per Ton.		
Coal.	July 1, 1901.	Jan. 1, 1902.	July 1 1902.
	s. d.	s. d.	s. d.
Best Northumbrian steam, f.o.b. Tyne .	13 0	11 3	11 4
,, ,, smalls, ,, .	5 1	5 9	5 4
,, Durham gas, f.o.b. Tyne	10 3	12 6	9 1
Barnsley thick-seam house, at pit . .	11 6	13 9	11 9
Best Cardiff steam, f.o.b. Cardiff . . .	19 3	16 3	16 0
Scotch splint, f.o.b. Glasgow	10 0	10 9	9 3
Coke.			
Best Durham foundry, del'd. Teesside .	15 3	17 0	15 4
Freights.			
Tyne to Hamburg	3 10	4 0	3 7
,, to London	3 1	3 3	3 3
Cardiff to Genoa	7 0	5 0	5 9
,, to London	4 0	4 4	3 9

The easing-off of the coal market, which, it is to be hoped and expected, has not by any means reached an end (for prices are still too high), has been accompanied by considerable reductions in the rates of wages paid in all districts excepting the Federated

coalfields of England, where only one reduction has been made, and that only quite recently. The following comparison shows how matters stand in the various districts:—

District.	Percentages of Wages above Standard. Dec 31, 1899.	Dec 31, 1900.	Dec. 31, 1901.	July 13, 1902.
Northumberland	25	61¼	30	26¾
Durham	33¾	65	36½	36½
Federated districts	40	50	60	50
South Wales	30	73¾	66¼	48¾
Fife and Clackmannan	53¾	97½	47½	41¼
West of Scotland	56¼	100	50	43¾

There have been during the past six months sporadic labour troubles in the coal fields, but no strike or lockout of magnitude. A restless and discontented spirit, however, appears to animate many of the men, who do not relish the return to normal wages after enjoying large "unearned increments" in their earnings during recent years; and grounds are not wanting for the fear that considerable trouble is not far distant, especially in the South Wales fields. Apart from this consideration, there exists no apparent obstacle in the path of coal consumers obtaining their supplies in the coming months as cheaply as, or more cheaply than, in the half year that has passed.

The home iron trade has been steady, with a moderate but well-defined tendency toward improvement, during the first half of this year—an improvement due in large measure to the very active condition of the iron and steel market in the United States, where the position is still well maintained. The volume of business done by the iron manufacturers in Great Britain has been, of course, still far below that in the "boom" period; and the improvement to which we have referred is only by way of a partial recovery from the very depressed state into which, upon the collapse of the "boom," the iron and steel trades incontinently fell. The number of furnaces in blast at the end of June was 346, compared with 341 last December, 333 on June 30, 1901, 318 on March 31, 1901, and 410 on June 30, 1900. The following table shows the course of the foreign trade in iron and steel for the June half years:—

Exports.	1900. Tons.	1901. Tons.	1902. Tons.
Pig-iron	819,442	447,486	377,589
Unwrought steel	184,448	104,657	135,949
Other descriptions	989,083	898,107	1,051,853
Total	1,992,973	1,450,250	1,565,391
Imports.			
Pig iron	51,324	62,010	117,884
Unwrought steel	29,991	64,329	134,350
Other descriptions	214,504	257,765	300,065
Total	295,819	384,104	552,299
Net exports	1,697,154	1,066,146	1,013,092

The remarkable features in the foregoing figures are the tremendous reduction in the exports of pig iron, and the steady growth of imports both of iron and steel; leaving the net export at a lower figure than in either of the two preceding years—about 40 per cent. indeed lower than in 1900. Considering these facts, and that production has shown no sign of materially increasing—as, with a big margin of idle plant, it should do upon any pressure of orders—it is remarkable that the price of raw iron should have risen so considerably as the following figures, taken from the "Iron and Coal Trades Review," show it to have done.

	Prices per Ton. July, 1900.	July, 1901.	Jan. 1902.	July, 1902.
Pig-iron—				
No. 3 foundry, Middlesbrough	69s. 0d.	44s. 3d.	43s. 3d.	51s. 0d.
Scotch warrants	67 0	51 11	49 1	56 9
,, hematite	83 0	57 0	55 6	60 5
Welsh	90 0	57 6	56 0	63 0
Manufactured iron—				
Marked bars	230 0	170 0	180 0	170 0
Common bars	215 0	140 0	150 0	135 0
Steel—ship plates, Glasgow	167 6	115 0	122 6	117 6

It is to be noted that stocks of iron are comparatively small, being at the present time considerably below 500,000 tons compared with over 1,300,000 tons before the revival of trade began in 1897.

Reference has already been made to the condition of the iron and steel trade in the States, which has now so pronounced an influence upon the markets in this country and in Germany and Belgium. The following particulars will give some indication of the activity existing at present in the States and (according to all reports) likely to continue for some time. In the eleven months ended May, 1901, the States imported 146,477 tons of iron and steel goods, and exported 1,072,798 tons—a net exportation of 926,321 tons. In the eleven months ended May this year, they imported 356,382 tons, and exported only 461,673 tons—a net exportation of 105,291 tons. For the month of May the imports were more than double the exports; being 82,239 tons, against 38,986 tons exported. In May, 1901, the imports were only 14,289 tons, against exports of 72,144 tons. There is no need to emphasize the meaning of such figures; they have only to be read for their effect upon the trade of the world to be understood.

Some observers of trade tendencies, notably the writer on the subject in the "Statist," are anticipating a considerable revival of trade in the near future, partly as an outcome of peace in South Africa, partly from reforms in the railway world, involving renewal of plant, and partly from the extension of electrical railway systems. But it should not be forgotten that the volume of business being done in the iron and steel trades at the present time is so far below the maximum capacity of the existing works, and the consumption of coal so far below the maximum possible output of the existing collieries, that no repetition of the situation of 1899-1901 can be witnessed unless an expansion of trade greater than any to be expected from the causes enumerated by the "Statist" contributor takes place. Moreover, any serious rise in the price of iron and steel in this country at the present time would lead to a great influx of imports from Germany and Belgium, where trade is in a very indifferent condition, and would open our markets also to American competition if once high-water mark were reached and passed by the demand for iron and steel in the States. Briefly, we look for neither "boom" nor "slump" in the immediate future; rather for a steady course of trade—unbroken, let us hope, by any serious labour troubles.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 294.)

THINGS in general on the Stock Exchange were bad last week, except in the American Market, which has got a line of its own. The cause of it all was still the same, over-speculation on the Peace, the ill-effects of which are not yet all wiped out. The week opened with steady selling through enforced liquidation; then after a bit there was a rather brighter ray. This, again, gave way to renewed gloom. And so the tendency oscillated until the atmosphere had cleared somewhat, and things closed much above their worst. In the Money Market, there was not much activity, and the tendency was in the direction of greater ease. In the Gas Market, there was a good deal more animation than has been the average of late; the moving influence being the working results of the first half of the year, so far as they are known or can be foreshadowed. In Gaslight issues, the prospect of a reduction of 8s. per cent. off the dividend—equal to £30,000 in money—further depressed the ordinary stock; and it opened at 89½. The next day there was a good bit of dealing without any fixed tendency; but on Wednesday a slight recovery set in, which was maintained until the close—the final mark being 92, the best of the week. The secured issues were rather uncertain at first, though the maximum was put up a point. South Metropolitan ordinary opened at 125½, and ran up to 127 on Wednesday, with an increase of half-a-point in the quotation. Then the too frequent profit-snatching set in, and the price went back. So that the half point gained was lost, and another half-point into the bargain. A single transaction in the old stock was all the business in Commercials. This Company's Bill in Parliament received the Royal Assent last week. By its provisions, the old 10 per cent. stock will, at the end of this year, be converted into 4 per cent. stock, and at the same time the new 7 per cent. stock will be converted into 3½ per cent. stock. In the Suburban and Provincial group, there were very few transactions. The only move was a rise in Alliance and Dublin old; but no business was reported in it. Transactions in the Continental Companies were extremely limited; but there was a good tendency, and Imperial advanced a point. None of the remoter undertakings made any sign. The Water Companies continue in a condition approaching stagnation, while they remain the bone of contention in Parliament. There was only one change—an advance in West Middlesex 3 per cent. debenture.

The daily operations were: Gas opened rather quiet on Monday, and prices were moderate. In Gaslights, the ordinary fell 1, and the maximum rose 1. In Water, West Middlesex 3 per cent. debenture rose 1. Tuesday's operations were chiefly confined to Gaslight ordinary, which was brisk. Quotations remained unchanged. Wednesday was rather less animated; but prices generally were better. Gaslight ordinary and Imperial advanced 1 each, and South Metropolitan ½. Thursday was equally firm; but quotations did not move. Business was quieter on Friday. South Metropolitan receded 1. Saturday was quiet and firm. Alliance and Dublin old advanced 1.

Coal in Russia.—The extraction of coal in Russia in Europe last year was 996,078,000 poods (1 pood = 36 lbs.), compared with 985,192,000 poods in 1900, 840,500,000 poods in 1899, 746,707,000 poods in 1898, 679,970,000 poods in 1897, and 569,473,000 poods in 1896. The extraction of coal in Russia in Europe is principally effected in the southern provinces and Poland; a small quantity was, however, raised last year in the Ural Mountains, in the neighbourhood of Moscow, and in the Caucasus. The yield of coal in Southern Russia last year was 694,420,000 poods, compared with 691,470,000 poods in 1900, 561,549,000 poods in 1899, 461,882,000 poods in 1898, 414,730,000 poods in 1897, and 311,763,000 poods in 1896. The coal extraction of Russia in Europe has attained about 1,000,000,000 poods per annum. The advance established in 1901 over 1900 was little more than 1 per cent. (10,886,000 poods); but in the five previous years the augmentation was 415,719,000 poods. The stocks in hand at the commencement of January last were 48,560,000 poods, as compared with 29,170,000 poods at the beginning of 1901.

PERSONAL.

At Emmanuel Church, Didsbury, last Wednesday, the marriage was solemnized of Mr. W. B. CRASS, eldest son of the late Rev. W. Crass, with ANNIE MARY, eldest daughter of Mr. John West, of Manchester.

It will be seen by our advertisement pages that the Crystal Palace District Gas Company require an Outdoor Superintendent. The reason is the appointment of Mr. JAMES AUCHTERLONIE, who now fills the position, as Engineer and Manager of the Cambridge Gas Company, in succession to Mr. R. Brown. Mr. Auchterlonie was trained at the St. Andrews Gas-Works, under Mr. J. Hall, and was subsequently for many years Gas Manager at Mullingar.

Our readers may remember that the directorate of the Crystal Palace District Gas Company was reduced a short time ago by the death, in close succession, of Mr. Bryan Donkin, the most recently appointed member, and Dr. F. Hetley, who had been a Director for upwards of forty years. One of the vacancies thus caused has been filled, as already announced, by the appointment of Sir Fortescue Flannery, M.P.; and we learn that Mr. CHARLES HUNT has been selected to occupy the other seat. Mr. Hunt has, we believe, been a fully qualified shareholder for many years; and it was only his professional engagements which stood in the way of a position on the Board being offered to him before. As he will shortly be coming to London, he will be free to give the Company the benefit of his valuable engineering experience; and the proprietors are to be congratulated on having secured the services of so able a technician.

At a recent special meeting of the shareholders in the Isle of Thanet Gas Company, presentations were made to the late Chairman and Deputy-Chairman—Mr. W. CURLING and Mr. J. T. FRIEND. The gift to the former consisted of a pair of silver five-light Chippendale candelabra and three solid silver oblong dessert baskets, the inscription on which was as follows: "Presented by the Isle of Thanet Gas Company to William Curling, Esquire, J.P., for his services as Chairman of the Company, 1887 to 1902. 18th July, 1902." The presentation to Mr. Friend consisted of a set of three handsome silver fruit dishes with glass linings, inscribed: "Presented by the Isle of Thanet Gas Company to James T. Friend, Esquire, D.L., J.P., of Northdown, Kent, for his services as Director and Deputy-Chairman of the Company, from 1872 to 1902. 18th July, 1902." The services of both gentlemen were warmly eulogized; and the best wishes of the meeting were expressed on their behalf. The gifts were suitably acknowledged.

OBITUARY.

We regret to announce that the serious illness from which, as notified in the "JOURNAL" last week, Mr. ROBERT BRIDGE, of Doncaster, had been suffering for some time, terminated fatally last Saturday. Deceased was born at Downham, in Suffolk, but spent most of his boyhood at Chatteris. He served his apprenticeship with the Grantham Gas Company; and afterwards accepted an engagement with Messrs. Milne and Son, of Edinburgh. He was subsequently on the staff of the Liverpool Gas Company, and eventually, in 1865, went to Doncaster as Gas Manager for the Great Northern Railway Company. He was appointed Manager of the Doncaster Corporation Gas-Works in December, 1877, in succession to Mr. S. Darwen, and entered on his duties in February in the following year. He joined the Gas Institute in 1874, and the Manchester District Institution five years later. He was also a member of the North of England Gas Association, of which he was President in 1889. The funeral took place on Sunday at Doncaster Cemetery, in the presence of a large number of mourners. The Mayor and Corporation met at the Mansion House, and, together with tradesmen, members of St. George's Lodge of Freemasons, workpeople in the Gas Department of the Corporation, and others, joined the procession there. Deceased was in his 67th year.

NOTES.

The Substitute for Coal.

An interesting answer to the question of what is to be done when the coal capital of the world shall be exhausted, is supplied in a recent letter to "Nature" from Mr. D. E. Hutchins, of Cape Colony. It is to the effect that it will be possible to supply the place of coal by quick-growing eucalyptus wood. The position in Cape Town to-day, according to this witness, is that it is cheaper to plough the ground and plant a forest of quick-growing eucalyptus trees than it is to import coal from over the sea or by a long and expensive land journey. As far back as 1882, the writer and Sir D. Brandis made the discovery that eucalyptus trees planted over tropical mountains will yield wood fuel at the rate of 20 tons (dry weight) per acre per annum in perpetuity. This wood reproduces itself when cut, without further expense, and is a stronger fuel than coal. The result in question was attained on the Nilgiris, Southern India; but Mr. Hutchins has no doubt that there are other parts where higher yields are produced even now. No doubt, also, when the coal supply is exhausted, selection and experiment will produce a forest vegetation that will yield more than the equivalent of 20 tons of coal per acre per annum. The sugar beet and all the fruits and vegetables of civilization prove how amenable plants are to the moulding of human wants. Why not firewood? Supposing it to be possible to grow 40 tons of firewood per acre per annum by scientific cultivation, and having regard to the extent of tropical lands suitable for the purpose, Mr. Hutchins calculates a total yield of wood equal to 161,000 million tons of coal yearly, which is more than 288 times the world's present coal consumption. On the basis of the actual forest yields of to-day, there would be one-half this gross production. If only one-eighth part of the earth's surface were afforested, the yield of firewood would amount to 20,175 million tons, or rather more than thirty times the world's present consumption of coal. Therefore, it is the prophecy of Mr. Hutchins that when our coal supply is exhausted, and all the useful water powers are appropriated, there will yet remain "that which Englishmen of all the civilized races of the world do most neglect—the forest" as an almost inexhaustible source of fuel.

Lighting Incandescent Burners.

A system of lighting incandescent burners in public lamps, patented by the Lacarrière Company, was described by M. Badon-Pascal at the last meeting of the Société Technique. The arrangement is shown in the accompanying illustrations. The top part of the lamp is, as usual, made of sheet iron, provided with a reflector which forms a wind-guard; the bottom is of plate glass. In this there are two openings—one for the burner, and the other to allow of the insertion of the lighting-pole. The latter hole is closed by a copper flap, attached to the framework of the lantern, as shown in the small diagram, which is a section of the lamp on the line A B of fig. 1. Between the tap and the cross-bar there

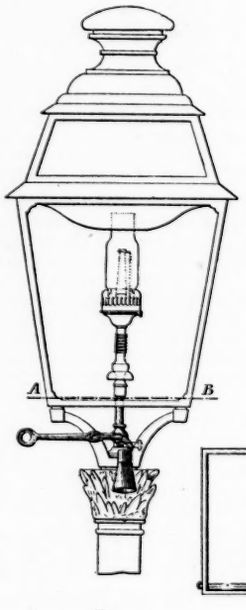


FIG. 1.

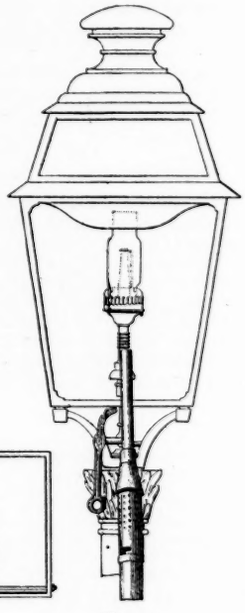


FIG. 2.

is fixed a key, which carries a guide formed by a cone surmounted by a cylinder. In order to bring the flame of the lighting-rod below the burner gallery, the rod is furnished with a tube sufficiently long to prevent ignition ever occurring in the injector of the burner. The addition of the tube improves the working of the ordinary torch; and numerous experiments have demonstrated that this modification does not interfere in any way with the igniting flame. It is claimed for this system of lighting incandescent burners that while the general appearance of the lamp is preserved, the opening of the tap is facilitated. The working of the arrangement will be apparent from the illustrations, fig. 1 of which shows the lantern with the tap closed, and fig. 2 with the tap open and the lighting-rod in position.

The death took place at Canterbury last Tuesday of Mr. William John Shaxby, the author of several books on various aspects of the labour question. He was in his 31st year, and since 1895 had been Assistant Secretary of the Liberty and Property Defence League.

TECHNICAL RECORD.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Perth.

This old-established Association held their forty-first annual meeting in the City Chambers, Perth, last Thursday. Mr. JOHN WILSON, Manager of the Tradeston Gas-Works of the Glasgow Corporation, the President for the year, called the members to duty promptly at ten o'clock, at which time there was a fair attendance. During the forenoon, the Council Chamber filled up till every seat was occupied; the assembly numbering about 130, —being one of the largest ever experienced in the history of the Association. Lord Provost Macgregor and several of the Magistrates in their robes of office, attended the opening ceremony.

WELCOME FROM THE CORPORATION.

The PRESIDENT said that at their forty-first meeting they were honoured by the presence of Lord Provost Macgregor and the Magistrates of the City of Perth. He thought the members would agree with him that it was a compliment and a high honour to them that these gentlemen had come there. If they could remain for some time to follow the proceedings, he was sure they would be very pleased; but it was quite possible that they might have other business which would call them away. He had pleasure in asking the Lord Provost to say a few words to the meeting.

Lord Provost MACGREGOR said it was a peculiar pleasure to him to offer the North British Association of Gas Managers a cordial welcome to the Fair City. In the name of the Magistrates and Town Council, and of the community of Perth, he could assure them that the members were most welcome in their midst; and they trusted that the time of the Association would be a very happy one, and that much benefit would accrue, not only to the Association, but to the great interests of the gas industry generally. He understood that the Association had reached forty years of existence. They could not be said to have yet reached the zenith of their power, or of their influence, for there was no such thing in science. It was always progressing, and going on from strength to strength and from glory to glory. In these forty years they had done a splendid work in their own particular department. The Association was, he understood, the parent one, not only in Britain but abroad —on the Continent and in America. He thought this was an honour to be proud of. The North British Association was the first to be in the field, and they had a large and influential following now, when they had come to such a good age. They were looked upon, very properly, as men of light and leading. That they were men of light did not, he thought, require any surgical operation to get into the head of anyone. This was demonstrated not only practically by their own profession, but theoretically by the manner in which they had evolved, from the material with which they dealt, the wondrous and marvellous powers which had been brought forward in the light and in the other products generally which were derived from coal. And that they were men of leading was, he thought, made clear by the manner in which they had been followed by other Associations, and by the way in which they carried on the wonderful works of gas engineering and gas manufacture. The Corporation were delighted to see them there. They, he was sure, would feel that the City of Perth was one of the most progressive in the gas world. The Association had had many great men in their midst—men who had taken a prominent part in all matters relating to gas-works from the beginning. They had had Mr. Mackenzie, who might be said to be the "Father" of the Association, and who, he understood, was Secretary of the Association for some twenty years. They had had such men as Mr. Myers, of Broughty Ferry; and the fact of his sons following in the footsteps of their father showed that they were not intending to stick in the "myres." They had certainly shown themselves to be worthy sons of a worthy parent, and in their carrying on of the gas-works at Troon and at Saltcoats they had maintained the prestige of their father. Then they had had such good men as Mr. Bartholomew and Mr. Boyd M'Crae; and they had such men as Mr. Foulis, one of the greatest men in the gas world—one who had shown his insight, his study, and his ability in making very useful inventions in their field, particularly in connection with the regenerative process. Mr. Foulis was certainly one of the very first gas managers and gas engineers of the present day. They had also a most worthy and capable gentleman in Mr. Gillespie, who had done so much good work for Perth. They had also, he might say, their own Manager —Mr. M'Lusky. Perhaps Mr. M'Lusky was the Moses who had led them to the city of Perth after wandering forty years in the wilderness.

The PRESIDENT said he was sure they were indebted to Lord Provost Macgregor and his colleagues for honouring them as they had done. The good weather they were having, and the great kindness shown to them, he thought, augured favourably for their having a good meeting. He asked them, with one accord, to give a hearty vote of thanks to Lord Provost Macgregor and his colleagues for honouring them that day.

Bailie WATSON said, as Convener of the Gas Committee, he wished to endorse most heartily the sentiments which had been expressed by their worthy Lord Provost. He could assure the Association that they all welcomed them most heartily to the Royal Burgh of Perth. He understood that on previous occasions they had met in Perth, but never in the City Chambers; and as they looked round them, they would find, in its windows, incidents set forth relating to the ancient history of the city, of which they were all proud. They had, in one window, a representation of King Robert the Bruce freeing the City of Perth from the English, and in others they would find interesting figures from Sir Walter Scott's "Fair Maid of Perth." These were illustrations of incidents in the history of Perth long before the birth of the manufacture of gas. From those days they had advanced greatly in the education and welfare of the people, but in none, he dared say, had they advanced so much as in that most interesting study with regard to the manufacture of gas. The last occasion the Association met in Perth was in 1890. They welcomed them because of their association with Perth. They also welcomed them because of the connection which their late Gas Manager—Mr. Whimster—still in retirement, had with the Association. On three different occasions they honoured him with the presidency of the Association. Mr. Whimster had been 44 years connected with the Perth Gas-Works, and he had no doubt that, on an occasion such as the present, he would recall, with very great pleasure, his association with them.

The LORD PROVOST thanked the meeting for their kindly references to the Corporation, and expressed the pleasure they would have in meeting the Association at the gas-works.

The civic party then left the meeting, the members meanwhile standing.

OBITUARY NOTICE.

The PRESIDENT said that in all their joys there was a trace of sorrow. A year ago his predecessor had the painful duty to refer to the removal by death of some of their most esteemed members, among others of Dr. Stevenson Macadam, one of their honorary members. At the same meeting they elected Professor Ivison Macadam, his son, to the vacancy on the honorary roll of membership; thus honouring the worthy son of a worthy father. It was his painful duty to refer to the tragic death of Professor Macadam under circumstances which they all deplored—cut down in the full vigour of his manhood. He took a keen interest in the affairs of their own and kindred Associations. Of genial and unassuming disposition—always ready to help a gas manager over any difficulty, plying the rod as a disciple of Walton, or, at the head of his brigade, ready to serve his King and country—his was a personality that one might have looked upon as likely to lead to high honours. But, alas, he had been cut off by the ruthless hand of an assassin. Their heartfelt sympathy went out to the widow and the fatherless, and the other relatives who were left to mourn his loss. In Dr. Andrew Stewart the Association had lost a valued extraordinary member, who was better known to the older than to the younger members—a man who had the welfare of the Association at heart, and who, in his own quiet way, went about doing good. In the person of Mr. J. C. Adamson, of Airdrie, the Association had lost another valued member, who was most regular in his attendance at their meetings, and was always ready to assist any gas manager or friend with counsel and advice. By the death of Mr. D. M. Nelson, of Glasgow, one of the most prominent members of the Association had been taken from them. His was a genial presence, and his voice was always raised in harmony at their meetings. These deaths had left a void in their ranks which it would be difficult to fill; and he (the President) was sure that the sympathy of the members went out to the mourning relatives.

THE ANNUAL REPORT.

The SECRETARY (Mr. R. S. Carlow) read the annual report of the Commitee, which was drawn up in the form agreed upon at the 1885 meeting. It stated that the Benevolent Fund of the Association had not been drawn upon during the past year; that no question of great importance on any special subject, in regard to either the manufacture or the distribution of gas, had been brought under the notice of the Committee for consideration; that the Committee's duties had therefore been of a very light nature; and that they had no particular point to lay before the members for their approval. As to the roll of membership, during the year thirteen ordinary members had resigned or left, four had died, one associate had been transferred to the ordinary list, and one honorary member had died. Thirteen ordinary members and two associates fell to be elected that day, and the roll would then be composed of: Ordinary members, 150; extraordinary members, 56; associate members, 17; honorary members, 8—total, 231, which was a decrease of four in the membership of the Association.

THE AUDITOR'S REPORT.

The accounts for the year were submitted. These showed, in the general fund, an income during the year of £103, and an expenditure of £108, with £12 odd due to the Treasurer. There

is a balance in hand of £42 (there having been a balance of £70 brought forward from the previous year). In the benevolent fund, there was an income of £32; and the fund now stands at £297. The income of the research fund was £13; and it now amounts to £128.

The AUDITOR (Mr. R. B. Main, of Glasgow) said he had much pleasure in submitting his report. They had had the statement printed, and he thought they were all agreed that it was an improvement on the old system of having to read every word. At the same time, there was this disadvantage, that the statement, when printed, was not audited, and there were one or two little corrections which had to be made; and these would be done when the transactions were printed. The benevolent fund was in a very healthy condition indeed, amounting to close upon £300—in fact, all the funds were in a very healthy condition. They were making progress every year, slowly, perhaps; and the only suggestion he might make to the Committee—if they would pardon him—was that he thought an appeal might be made now to get the benevolent fund up to £500. It was quite true that they had not drawn upon it last year. But they did not know what might happen in another year; and if two or three serious cases were to come in, he did not think the fund was in the condition which it ought to be. He did not think there would be much difficulty in getting money, if an appeal was made. He had much pleasure in bearing testimony to the excellent way the accounts of the Association were kept. All the funds were on deposit in the bank; there was no current account at all.

The PRESIDENT said the Auditor was another official who did his duty thoroughly. He would like them to give him a hearty vote of thanks.

NEW MEMBERS.

The following new members were admitted to the Association:—

Ordinary Members.—Bishop, Alex., Dalkeith; Black, J. F., Newport, Fife; Brown, W., Lasswade; Bruce, J., Lockerbie; Croll, R., Castle Douglas; Fraser, D., Gorebridge; Irvine, D., Kirkcudbright; Johnston, A., Armadale; Kelloch, W., Kilsyth; Lawson, W., Monifieth; M'Giffen, W., Huntly; Napier, R. A., Comrie; Stevens, J.P., Elie.

Associate Members.—Barker, J., and Kennedy, J., Friarton, Perth.

Mr. A. MACPHERSON (Kirkcaldy) said he had much pleasure in proposing the adoption of the Committee's report.

Mr. J. WHYTE (Seaham Harbour) seconded the motion, and it was carried unanimously.

ALTERATION OF THE RULES.

The PRESIDENT said there was one thing he wished to draw their attention to before they went on with the papers. Rule 27 provided:

> The Committee shall, previous to the annual meeting in each year, prepare a list of members whom they nominate as suitable for the offices of President, Vice-Presidents, Treasurer and Secretary for the ensuing year. The list shall also contain the names of twelve members whom the Committee nominate as fitted to become members of Committee; a copy of such list to be forwarded to each member of the Association before the annual general meeting, and each member shall be at liberty to make a selection from the list, or to substitute the name or names of any other member or members, for each respective office, but the number of names so selected or substituted must not in any case exceed the number to be elected to the respective offices.

The Committee recommended that this rule be altered by adding to it: "The Secretary and Treasurer shall not necessarily be a member of the Association;" and this required to be passed by the Association. All along the Secretary had been a member of the Association. Now he was what some called a trader; but in Section II., 3 of their rules it was provided: "Ordinary members shall be engineers and managers of gas-works, who may make application for membership and be admitted, except in special cases where the Committee and the general meeting deem it necessary that this rule should be relaxed." Under the last section, they might retain their Secretary, and by altering the rule as proposed, they would prevent, or save, any discussion, and would leave themselves free, at any time, either to accept a member as Secretary or get an outside man, which they could not do under the present arrangement.

Mr. A. MACPHERSON (Kirkcaldy) moved that the meeting agree to the recommendation of the Committee.

Mr. J. WHYTE (Seaham Harbour) seconded the motion.

The recommendation was unanimously agreed to.

INAUGURAL ADDRESS.

The PRESIDENT delivered his inaugural address, as follows:—

Gentlemen,—In rising to address you to-day as President of this, the forty-first annual meeting of the North British Association of Gas Managers, allow me, in the first place, to thank you for the high honour you have conferred upon me in electing me to this position—a position which has been filled by so many able members of the Association, who, by their ability in the discharge of the duties of President, have left a high standard to which it is difficult to attain. I would therefore ask you to overlook my many imperfections. The difficulty in serving up fresh matter in his address is year by year becoming greater to each succeeding President, the more so in our case, as all the other important meetings have already been held, and all the more recent and up-to-date processes have already been touched upon, leaving an almost barren field to turn up. Under these circumstances, I cannot do better than give you a short *résumé* of matters connected with the works under my charge.

On first becoming connected with the Tradeston works of the Glasgow Corporation, in March, 1883, the maximum daily make of gas, in the year 1882-3, was 3,558,000 cubic feet, while the total gas made for the year ended May 31, 1883, was 601,615,000 cubic feet. In these early days, the old order of things held full sway. Direct-fired settings of sevens were then in use. In 1888, to meet the ever-increasing demand, a scheme of remodelling the works was begun, and advantage was then taken to meet the demand for up-to-date plant, which gave scope to the engineering ability and skill of the Engineer-in-Chief, Mr. William Foulis. This is clearly shown in the admirable arrangement of the works, in the substantial buildings, and in the machinery now in use.

The coal is delivered from a high-level railway direct into the hoppers of the coal-breakers. On passing through the breakers, it is elevated into overhead storage tanks, from which the hoppers of the charging-machines are filled. Carbonizing is carried out in settings of eights and twelves, on the Siemens-Foulis regenerative plan full-depth, with outside producers; and excellent results are obtained. The retorts are drawn by the Foulis drawing-machine. The coke falls down, through shoots in the floor, into small side-tipping trucks, or into producers, as required. When these trucks are filled, they are conveyed into the yard by small locomotives on a narrow-gauge railway, and tipped over a tipping-bank, where the coke is quenched; after which it is lifted by a grab crane on an elevated platform, and either loaded, unriddled, into trucks, or delivered to a rotary screening plant, by which it is screened into three sizes or placed into stock, as demands require. We have three such steam-cranes in the works. They are capable of dealing with the coke produced from 1000 tons of coal per day.

Charging is done by means of Arrol-Foulis machines, which have given excellent results, both as regards quantity of coal carbonized and wear and tear of machines and retorts. Each machine regularly draws and charges 40 retorts per hour. These machines have been at work for the past ten years, and during that time we have never had to resort to charging a single retort by hand. Compared with the old order of things, when hand work was in use, the advantages of these machines have been many, among which can be counted absence of the trying conditions under which hand stoking was conducted, more regular charging, a lesser dependence on the whims of men, and, not least, the cheapening of the cost of production.

The total cost with hand work, including all charges connected with carbonizing 240 tons per day and emptying the coke into the yard, was 34·337d. per ton of coal carbonized. With machinery, notwithstanding an increase in wages, the cost to-day for the same work is 18·625d. per ton of coal carbonized. With hand work, the number of men employed was 148; with machinery the number required for the same amount of work is 79. This, compared with inclines, when the first cost is taken into account, also the cost of renewals and repairs and tear and wear, is very favourable, when both systems are fairly considered.

Condensation is carried out with the utmost regularity; the temperature being maintained at from 60° to 65° Fahr. At the outlet of the condensers, the gas is further treated by three of Walker's tar-extractors and two of their purifying machines, also by two of Kirkham, Hulett, and Chandler's washer-scrubbers; every effort being made to remove as much of the impurities from the crude gas as possible. Purification is performed by the use of Irish lime only, the stone being imported and burned on the works. The advantage of using lime only is the low percentage of sulphur compounds per 1000 cubic feet; but on the other hand, there is the disadvantage of having such a large quantity of spent material to dispose of.

Distribution is divided into seven districts, each controlled by one Foulis governor. These governors range from 18 up to 30 inches in diameter, and possess the advantage that they can be put on the trunk main at any convenient point, the air vessels being placed in line in the meter-house, and in such a position that they are under the observation of the attendant. Each governor is fitted with a King's gauge and pressure register, the records of which are forwarded to the head office daily, where they are retained for reference, as required. The maximum daily make of gas during the past year was 8,853,000 cubic feet. The total gas made for the year ended May 31, 1902, was 1,837,199,000 cubic feet.

During the past year, considerable progress has been made in the more general use of incandescent burners, both for private and public lighting. The reduction in the price of mantles will be a further inducement to adopt this system; and it is to be hoped that in the near future a more stable mantle will be in the market. Nothing, so far as I am aware, has been done in Scotland towards the maintenance of this system of lighting by companies or corporations. This is a matter worthy of consideration, and it should tend to settle the vexed question of high *versus* low grade gas.

The market for residuals is more favourable than it was twelve months ago; so also is the coal market. These favourable circumstances will, of course, ultimately benefit the consumer.

The demand for appliances for cooking, heating, and motive power still continues, and this will in the future make the summer consumption more nearly equal to the winter than it has been in the past. Attention to the wants of the consumers requires to be carefully considered. Whether it be in attending to a trifling complaint or the hire or purchase of a cooker or slot meter, every effort should be made to convert each householder into a paying consumer.

Mr. D. ROBERTSON (Dunoon) said he was sure they had all listened with much pleasure to the President's address. He certainly had not wearied them with a long address, but someone had said that "brevity is the soul of wit;" and Mr. Wilson had certainly given them the soul of wit. He had given them a great deal of information relating to the stupendous works of which he was the Manager; and they felt, in Mr. Wilson's figures, that their comparatively small works were really, they might say, beneath Mr. Wilson's notice. But, at the same time, it must be their endeavour to try and approach, as near as possible, the works of the President with their own results; and it was surprising how near some of the members of the Association could come to him. Although they had not the same field for experimenting, they could, in a small way, follow Mr. Wilson's example. He was sure they had all been pleased to hear the address, and he moved a very hearty vote of thanks to Mr. Wilson.

The PRESIDENT thanked the meeting for the patient hearing they had given him, and for their accord with Mr. Robertson's reference to him. He was afraid he was not cut out for being a President. Drumming up and down the retort-house fitted him better; not many questions were asked there. He had it all his own way mostly there, and it was easier getting on.

THE READING OF PAPERS.

The reading of papers was then proceeded with. These, in the order in which they were taken, were—

"Modern Retort-House Practice." By Mr. W. B. M'Lusky, of Perth." [See p. 268.]

"Some Experiences with Condensing Plant." By Mr. W. Currie, of Alexandria. [See p. 273.]

"The Use of Lime and Oxide of Iron in Purification." By Mr. T. Lighbody, of Renfrew. [See p. 275.]

VISIT TO THE CORPORATION GAS-WORKS.

Shortly after noon, in the midst of the discussion upon Mr. M'Lusky's paper, an adjournment of an hour-and-a-half was made, to enable the members to visit the Corporation gas-works at Friarton, about a mile to the south of the town, on the banks of the River Tay. The visit was paid on the invitation of the Magistrates of Perth, who provided conveyances to take the visitors there and back. Eight fully-loaded vehicles deposited the members at the gates of the gas-works. These were fully described in the "JOURNAL" on the occasion of their formal opening in April, 1901.* The visitors walked through the retort-house and coal-store, which are under one roof, and in which, it was observable, the ventilation was particularly good. The carbonizing power of the work is being doubled by the erection, in the space left for it, of an extension to the retort-bench. The new portion, like that in use, will consist of seven ovens containing eight through retorts each, or 112 mouthpieces in all. The stoking is done by West's manual charging and drawing machines. As Mr. M'Lusky stated in his paper, it is proposed to introduce improved coal-handling plant, and plant for dealing with the coke, which will greatly lighten and cheapen labour. Should further extensions of the works be required, there is room for the lengthening of the retort-house to double what it will be when the present extension is completed; and outside there is ample room for the enlargement of all the other apparatus which will be necessary. After the retort-house had been seen, the visit resolved itself into an itinerary of the works, with Mr. M'Lusky and Bailie Watson, the Convener, accompanying. Everything was found most complete in design and in perfect order. Particular admiration was given to the meter, governor, and exhauster houses, and to the laboratory and photometer house, which is one of the finest and best equipped that may be seen anywhere. Refreshments were served before leaving the works, and a cordial vote of thanks was accorded to the Magistrates for their kindness.

ELECTION OF OFFICE-BEARERS.

On resuming, the report of the Scrutineers (Mr. A. MACKENZIE, of Edinburgh, and Mr. A. MUNN, of Glasgow) on the election of office-bearers was submitted. It showed that the following had been elected:—

President.—Mr. THOMAS LIGHBODY, of Renfrew.

Vice-Presidents.—Mr. P. ROBERTSON, of Dunoon; and Mr. W. BLAIR, of Helensburgh.

Secretary and Treasurer.—Mr. R. S. Carlow, of Perth.

Members of Committee.—Mr. A. Macpherson, of Kirkcaldy; and Mr. L. Hislop, of Uddingston.

Auditor.—Mr. R. B. Main, of Glasgow.

* See "JOURNAL," Vol. LXXVII., p. 1132.

NEXT PLACE OF MEETING.

The next place of meeting is to be Ayr.

VOTES OF THANKS.

The PRESIDENT, at the close of the discussions, said his duty now was to move a vote of thanks to the gentlemen who had read papers that day. All the three of them, he knew, had devoted a deal of time and energy in the preparation of their contributions, and had put their whole energy into the work. There had been good discussions, which, he hoped, would be a benefit to them all. He had only one thing to remark in connection with the papers. There was a saying that "The early bird gets the worm." Well, twelve months ago, when the meeting was finished in the University of Glasgow, something struck him as they were walking down to their dinner. He thought he had better be the early bird and see if there were any worms about; and he secured three papers from the three gentlemen that day. It might be a little hard that, unless the President ran about among his friends, papers were not to be got—that there were scarcely any replies to the circular which the Secretary issued. Now that there were so many young men in the Association, it would be a great benefit for all if some of them would come forward with papers. However, he was delighted that his friends promised so readily a year ago, and that they had turned up so well that day; and he wished the members to join in giving them a hearty vote of thanks.

PRESENTATION OF THE PRESIDENT'S MEDAL.

Mr. W. R. HERRING (Edinburgh) presented the President's Medal to Mr. Wilson, as a memorial to him of the friendships he had made and renewed during his term of office.

The PRESIDENT, in returning thanks, said he regarded himself as not an ideal President. He must thank the Committee for having given him every support, and Mr. Lighbody and Mr. M'Lusky especially, for the yeoman service they had rendered in making the arrangements for that day. After all, it was a happy job being a President, when he thought of it. Proceeding, he said he had to propose a vote of thanks to the Secretary. In the early days, before he was in office, he thought that the President always bestowed too much "butter" on the Secretary, and made them believe that he was the cleverest man living; but after being through with the presidentship, he must admit Mr. Carlow was up-to-date with his work, and he was certainly obliging. He never required to ask the Secretary for anything; he always kept him fully posted up with information. He asked them to give Mr. Carlow a hearty vote of thanks. They wished him long life, for they did not think they could be better served by another man.

Mr. CARLOW thanked the President for the way in which he had spoken of him. Undoubtedly he had come through a very severe trial in the past year—a trial he did not wish his worst enemy to come through. However, that was past, and he had only to say that, so far as he was concerned, he had always had the interest of the Association at heart; and, seeing they had elected him for another year, he would endeavour, so far as in his power, to do the very best he could both for the practical and the financial success of the Association. He had no doubt everything would go on as pleasant as it ever had done. He was glad to think that he still retained their confidence, and that they had elected him Secretary for another year.

Mr. T. LIGHBODY (Renfrew) proposed a vote of thanks to the Municipality of Perth for their kindness in granting them the use of their chambers to meet in. He thought that in all the years the Association had existed, they had seldom met in such palatial surroundings.

Bailie WATSON, on behalf of the Corporation, assured them that they appreciated the visit of the Association very highly indeed, and they hoped it would not be so long till they came back.

This concluded the meeting.

The members and friends (including ladies), to the number of about 150, dined together in the Salutation Hotel. Mr. Wilson again presided, and had on his right and left at the table Lord Provost Macgregor, and Bailies Watson and Grieve. The toast of "The North British Association of Gas Managers" was proposed by Bailie Watson in a eulogistic speech, and was acknowledged by Mr. Lighbody, the President-elect. "The Fair City of Perth" was proposed by Mr. A. Macpherson, of Kirkcaldy, and was acknowledged by Lord Provost Macgregor.

In the evening, a number of the members and their friends went on a drive to Scone Palace, the grounds and gardens of which were open to them. The weather was, unfortunately, somewhat showery.

On Friday, a large party enjoyed an excursion, in at times threatening, but on the whole very favourable, weather, to Crieff, driving from the railway station there to Drummond Castle, the gardens of which they very much admired. Dinner was served in the Royal Hotel, Crieff, and afterwards, while many spent the afternoon visiting the attractions of the neighbourhood, some started at once on their return homewards, others to their holiday resorts; and thus the meeting came to an end.

MODERN RETORT-HOUSE PRACTICE.

By W. B. M'Lusky, of Perth.

[A Paper read before the North British Association of Gas Managers.]

[Mr. M'Lusky, before reading his paper, said he regretted the absence of Mr. Whimster. Mr. Whimster had, however, given him a message to the Association, to the effect that as his holiday had been arranged some time ago, he could not possibly attend the meeting, and also that he did not think he would be able to bear the restraint of listening to a discussion without taking part in it; and that at his age—84 years—he did not think it would be good for him to do so. Continuing, Mr. M'Lusky said that Mr. Whimster was still so solicitous for the welfare of the Perth Gas-Works that he got a little excited during the winter months; and he was just like a Gas Manager in this that, when it came to spring, he felt that he must go away to recuperate.]

In his circular inviting papers for this meeting, the Secretary again refers to "the activity which characterizes the present period in the gas industry" as a sufficient reason why subject-matter calculated to provoke profitable discussion should be provided. At no period in the history of the gas industry in the North has this oft-repeated statement been so well timed. To mention the epoch-making work of Mr. Foulis at Provan, and of Mr. Herring at Granton, is at once sufficient to inspire men of less skill to be improving their knowledge, and engineers holding positions of less importance to review their methods. In the march of progress, it is undoubtedly true that, in his endeavours to keep in line with the excellent results obtainable in works of magnitude, the provincial engineer is beset with difficulties peculiar to the conduct of business on a small scale. Any enterprise upon which he embarks is more hazardous than in the case of a large establishment where there is greater facility for experimental work, a larger field for application of new schemes, and practically unlimited resources in the event of partial or complete failure.

The primary object of the gas department at present is the economical production of gas suitable to serve efficiently the various purposes to which the commodity is applied. The first step towards success in this direction is sound retort-house practice. No gas undertaking, however small (provided that regular working is practicable), can afford to have comparatively second-rate carbonizing results. The importance of this is evident from the amount of attention which has been bestowed upon the subject recently by gas administrators in high places, and by engineers whose judgment in such matters we are bound to respect.

For some time past, the engineers of large undertakings have been more particularly engaged in determining the relative effect of various systems of work upon the wages bill than in discussing the simple question of heating retorts. No controversy has so fascinated the profession as the discussion in the Technical Press upon "Machine Charged Horizontal Retorts *versus* Inclined Retorts"; "Centralized Hoppers *versus* Continuous Hoppers;" and the value of the numerous ingenious accessories which have been devised and applied to simplify the working of the various systems in order to increase the revenue-earning power of the capital employed, and to reduce wear and tear charges and carbonizing wages, while securing the most efficient and uniform results possible. The comparative results of the working of these systems on a large scale, under conditions favourable to each, will be watched with the keenest interest.

It is not my purpose here to discuss the relative merits of inclined and horizontal retorts. The solution of this problem is in able hands. I propose rather to discuss the general question of carbonization in so far as it concerns the general body of the members of this Association. It is acknowledged that, for the economical production of gas, the temperature of the retort must be maintained at 2000° Fahr., and that to accomplish this, all that is required is a gas-producer constructed to contain a sufficient quantity of coke, disposed in such a manner as to provide a regular supply of carbon monoxide gas of good quality to the setting.

It has not been so generally admitted that gas so generated should be equally distributed throughout the length of the setting before secondary combustion takes place. But it is established that a supply of heated secondary air is necessary, and that the heated air should approach the gas at the point where the latter enters the setting proper; and, further, in order to obtain satisfactory results from the high temperature which ensues upon secondary combustion, the retorts must be so set and arranged as to provide for an equal distribution of heat throughout the oven—the temperature being controlled by a careful adjustment of the primary and secondary air inlets and damper openings, based upon simple tests of the waste gases. Settings constructed upon these lines are productive of the most satisfactory results, provided always that the material and workmanship are of the best quality, and that the channels through which the secondary air passes to the combustion chamber are sufficiently tight to prevent "short-circuiting" of the heated air into the waste-gas flues.

No amount of thought and attention bestowed upon the perfecting of the design and arrangement generally will compensate for a defect in the air-passages. Various expedients have been tried from time to time to remedy this great evil; but in many cases with disappointing results, due not so much to any weakness in the design itself, as to difficulties experienced in getting the work put together in such a manner as to secure a tight joint to begin with, and to provide against the risk of fracture or displacement in the working. I am of opinion that the simple application of the principles of recuperation gives the best average results, offers the greatest security for the capital employed, and is most profitable in the end. I have found that well-shaped bricks, properly laid by skilled workmen, make the most secure division walls between the secondary air and waste-gas flues. To reduce the risk of short-circuiting, I employ a triangular joint in the vertical joints of the flue walls and in the horizontal joints of the flue-covers.

In stage-floor benches (see fig. 1), the flues are carried under each other and sandwiched vertically between the waste gases and the producer walls in the usual manner But in small settings built on the semi-stage or shallow chamber plan, the secondary air flues are constructed on the horizontal line as shown (fig. 2), sandwiched between the waste-gas flues. In the latter arrangement, which has the advantage of thoroughly heating the air within a small space, the cost of excavation and underbuilding is reduced to a minimum, and all flues and dampers are accessible from the ground-floor line. Short-circuiting, if it does ensue, will occur between air and air, not between air and gas.

The advantages of the regenerative system are admitted. Cases of failure have been recorded arising from various causes, but directly traceable, in some instances, to the multiplication of passages of restricted area, requiring excessive chimney draught, and resulting in the undue formation of clinker and aggravation of the evil of short-circuiting; but such cases are exceptional.

The advent of the regenerative system of heating retorts marked the beginning of better conditions of labour for the stoker, and more uniform and economical results in the retort-house; and the general prosperity of the gas undertaking has been shared by the workmen, and rightly so, in increased wages and a shorter day of labour. Carbonizing costs are consequently high; and attention is largely centred upon ways and means of reducing this item.

In up-to-date works of sufficient size, simple hand labour has been supplanted by mechanical appliances, in whole or in part, by machines worked by hand labour or machines merely directed by skilled hands. The 10-ton coal-waggon is caught upon the hydraulic ram, or at the end of the cable from the warping drum of a steam-winch, and the contents are deposited in the store or to the coal-breaker or elevator boot direct, or through the feeding hoppers, as circumstances permit. In well-arranged works, a twenty-four hours' supply of coal is elevated, within an "eight-hour turn," to the overhead bins to supply the machines by gravitation as required. To complete the mechanical equipment, hot-coke conveyors, elevators, screening and sorting plant, and coke-storage hoppers over railway sidings have been more recently applied, by means of which the market for coke has been materially improved, and the arduous and unhealthy task of wheeling and quenching hot coke is entirely superseded.

Such arrangements may fitly be described as automatic in their action. Yet those of us who have had years of experience of hand labour, as we find it practised in Scotland, may be slow to convince that the mechanical stoker is "a machine so constructed as to imitate the actions of men . . . .;" and if mechanical stoking is not applied in small works in Scotland to the same extent as we find it south of the Tweed, the explanation may be that our stokers—like the proverbial "man with the barrow and shovel"—take a lot of beating. There can be no question, however, that our boasted record hand-labour results have been obtained to a large extent at the expense of the working man. It has been urged that gas stokers, taken as a class, are the healthiest set of men in the community. While admitting that the work is by no means unhealthy—far from it—I am prepared to say that gas stoking never made a man healthy, and that, unless he had been constitutionally strong to begin with, he could not have endured the strain.

Judged from a purely commercial standpoint, if twenty-four good men can do a certain amount of work by simple hand labour, thirteen men selected from this number will, with the aid of coal breaking and elevating plant and manual stoking machines, accomplish the task, including hot-coke wheeling, with less expenditure of energy, and will return to work after sixteen hours' rest more fit than the hand stoker possibly could be. A further advantage accruing from the use of machinery is that the quality of the work does not vary with the individual skill of the men employed, as is the case with shovel charging. One intelligent and reliable leading stoker on each set of machines is able to control the quality of the work performed by his squad, and one man is responsible for the effective carbonization of the coal used; and the results obtained, so far as affected by labour, are more uniform than is the case with shovel charging. In the event of sickness, moreover, the place of the absentee can be more easily filled.

The balance of efficiency is, therefore, on the side of machinery. But what of the ultimate cost? The guiding principle in our consideration of any scheme is the cost per 1000 cubic feet of gas of a given illuminating power. The value of any system of work, taken upon a commercial basis, must be measured by

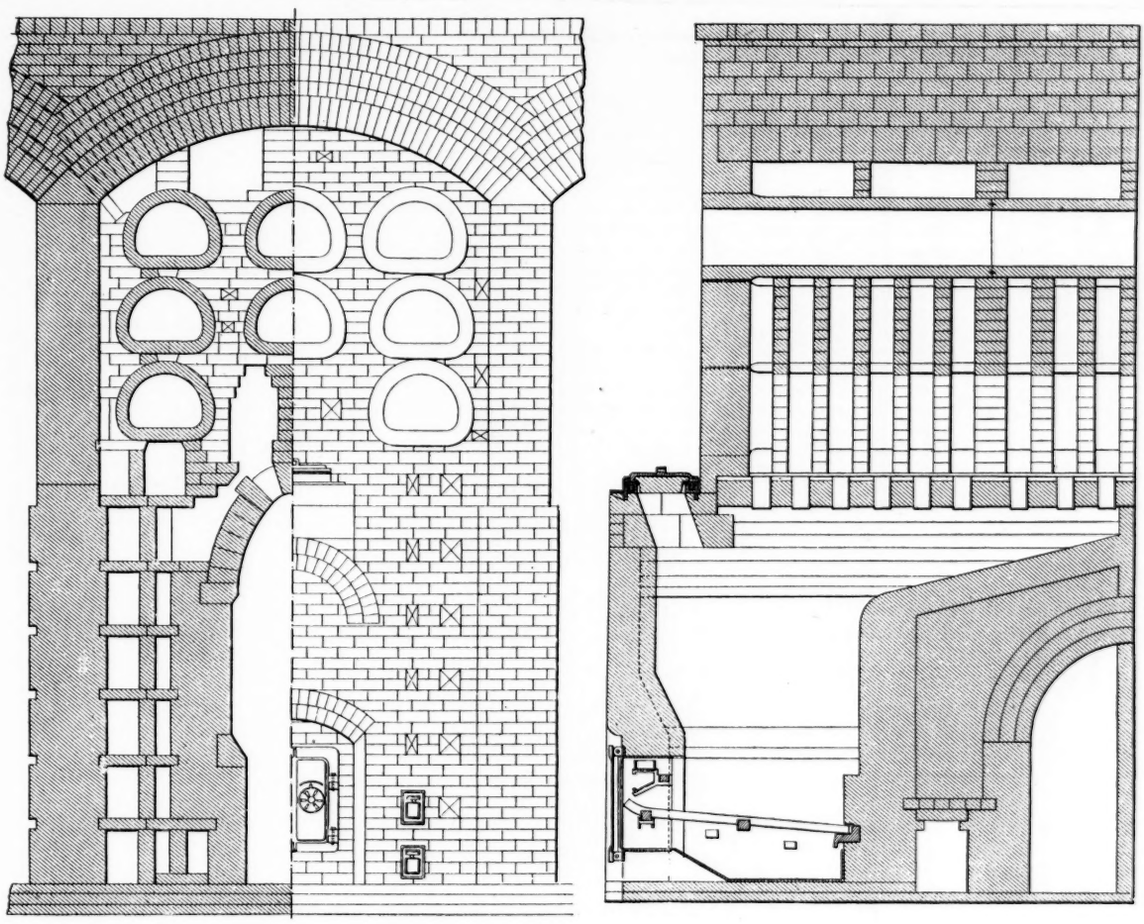


FIG. 1.

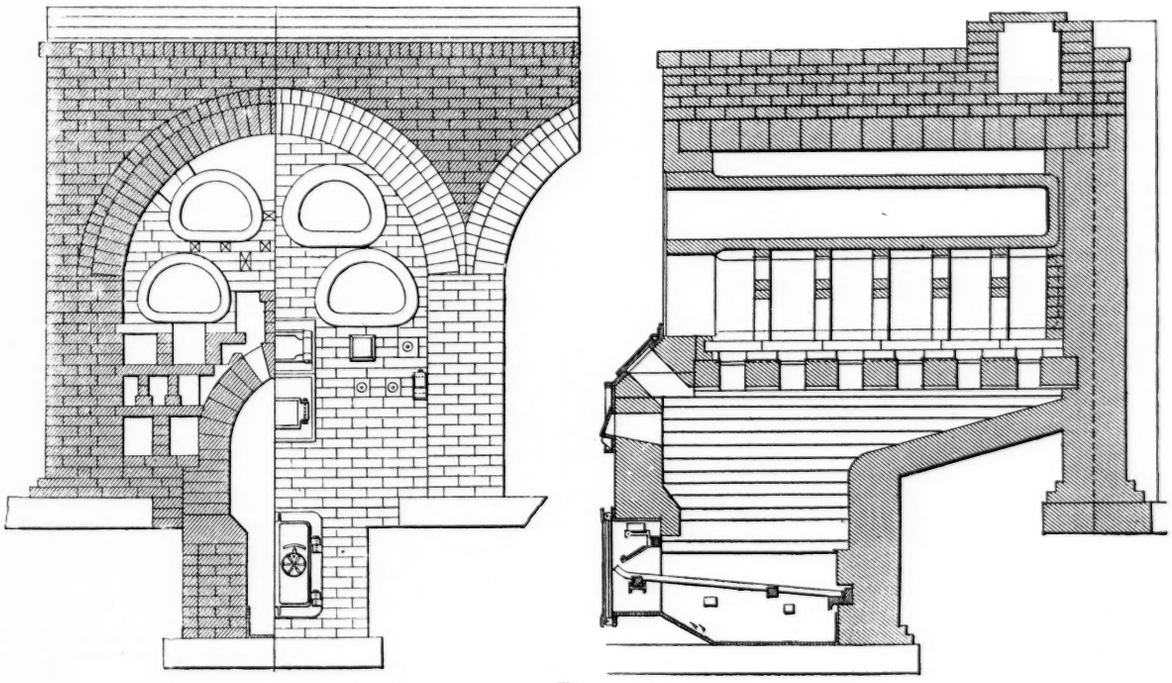
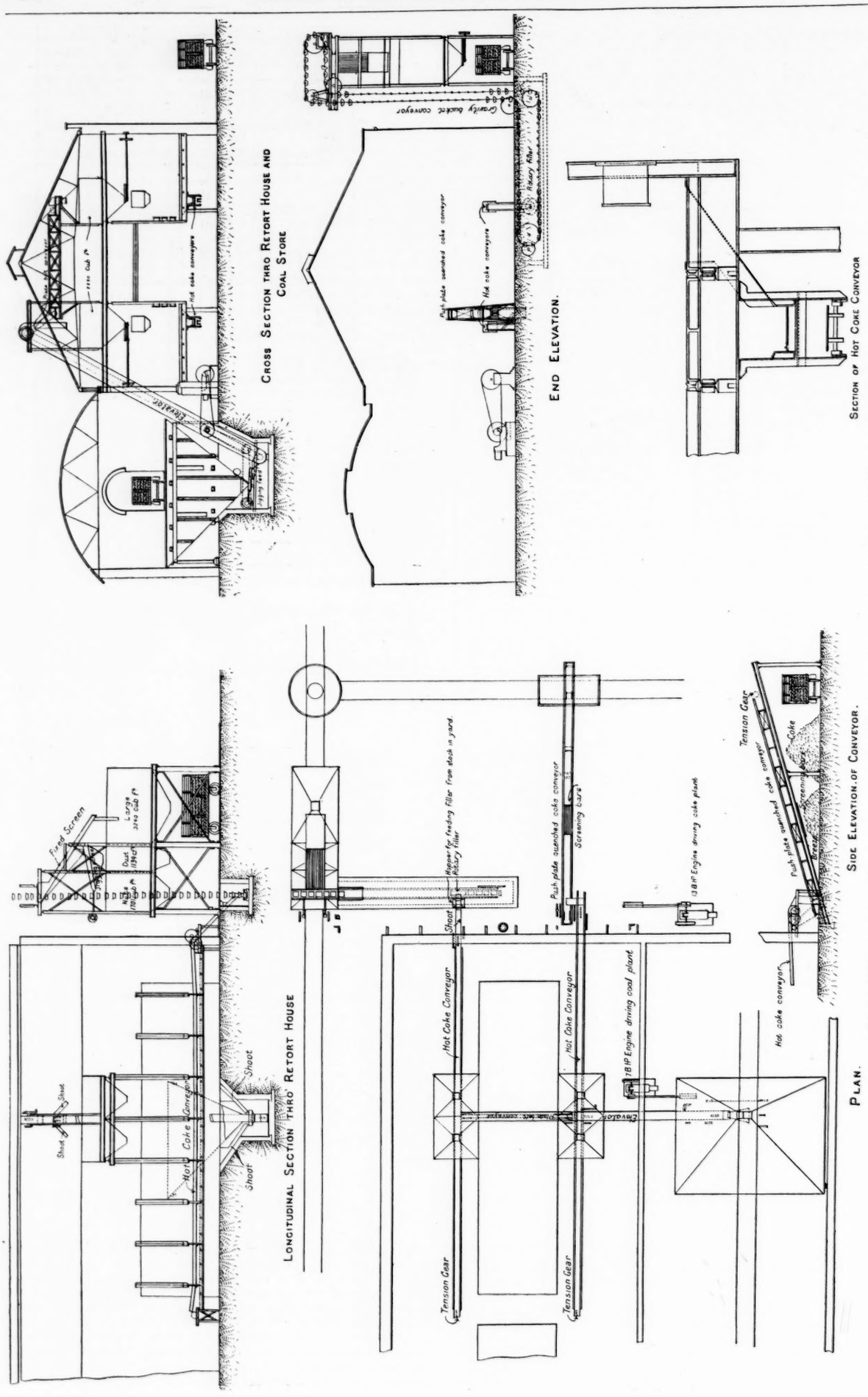


FIG. 2.

its influence upon the cost of the material and labour per 1000 cubic feet, after meeting repairs and maintenance charges, renewals, interest, and redemption of the initial expenditure on the plant employed.

The success or failure of an installation depends not, as might at first sight appear, so much upon the amount of money spent upon the plant, as upon its design and arrangement to suit the peculiar set of circumstances which have to be met. Mechanical coal breakers and elevators are necessarily centralized appliances. In well-arranged works of large proportions, the coal is dropped upon the breakers, through which it passes to elevators, and is delivered upon conveyors which carry it to centralized hoppers for immediate use, or, alternatively, to the store, from which the coal is again elevated to the centralized or continuous overhead hoppers as the case may be. The latter method mean "double handling," which, in small works dealing with small quantities would, in the result, be more costly than hand labour. If regular supplies of dry and otherwise suitable coal could be depended upon every day in the year, the problem would be solved. But coal deliveries equal to the day's demand must be



PROPOSED COAL AND COKE HANDLING PLANT AT THE PERTH NEW GAS WORKS.

maintained in winter; and portions of the supply that are set aside as too wet for immediate use will, if it is moved to the boot of the elevator again by hand labour, result in largely increased carbonizing costs for the time being, to avoid which the risk of working wet coal is not infrequently taken, and serious loss incurred in reduced yield per ton and in illuminating value.

Such difficulties are, it is true, peculiar to small undertakings in which the saving to be effected by a complete equipment of machinery would not be sufficient to balance the increased fixed charges incurred. To meet the case, the writer has elaborated a scheme to work in conjunction with and between the high-level and low-level railways in the Friarton Works, Perth, by means of which the difficulties referred to will be modified to some extent, if not entirely removed. Taking advantage of the fall of 15 feet from the high-level railway to the floor of the coal-store, the scheme provides for the construction of a hopper having a capacity of 175 tons of coal (equal to two days' maximum demand) constructed immediately underneath the railway, and extending to a depth of 8 feet under the coal-store floor, to which point the floor of the coal-store will be sloped at a suitable angle in the vicinity of the hopper, so that dry coal may be drawn from the store by gravitation in the event of the daily deliveries being wet. The elevator will be fixed in front of the feeder at the bottom of the hopper, from which point the coal will be raised to overhead storage hoppers, having a capacity equal to fully 24 hours' maximum demand. The scheme further provides for the conveying of hot coke direct to screens, sorting plant, and overhead storage hoppers having a capacity equal to about three days' production of coke, nuts, and breeze. Provision is also made for storing coke in the yard direct from the hot-coke conveyer in a position convenient to the gravity bucket elevators, so that stock may be elevated without having recourse to hand labour.

The coal-handling section of this plant is distinctly a profitable labour-saving appliance; and in the coke-handling section—while securing improved conditions of labour—it provides, in the screening and sorting of coke for the market, a degree of efficiency which is not attainable by hand labour unless at considerable expense. As a matter of fact, this section of the plant will effect a saving sufficient to redeem the total initial outlay in from five to six years.

It may be argued—possibly with a certain amount of reason—that, in some cases, mechanical equipment has not shown a great margin of profit over well-directed hand labour. This will depend to a considerable extent upon the efficiency of the machinery, and upon the quality of the hand labour supplied; also upon whether with the introduction of machines, circumstances of a disadvantageous or of a compensating nature have arisen. It is not sufficient to simply "put through" a given quantity of coal; the general efficiency of the retort-house work must not be sacrificed to any branch of it. A careful analysis of accounts may show that in some cases where the carbonizing wages are low, the yield of gas per ton of coal carbonized is correspondingly low. In other instances, the carbonizing costs may be higher and the cost of coal relatively high; yet the ultimate cost per 1000 cubic feet of gas into the holder may compare favourably with those cases where the labour charges per ton of coal are less. Thus for example :—

Cost of Coal and Carriage per Ton.		Carburetting Wages per Ton.		Total.		Yield of Gas per Ton in Cubic Feet.		Carburetting Wages per 1000 Cubic Feet of Gas Made.
12s.	+	1s. 6d.	=	13s. 6d.	÷	9,000	=	1s. 6d.
13s.	+	2s. 0d.	=	15s. 0d.	÷	10,000	=	1s. 6d.

While wages in the one case cost 2d. per 1000 cubic feet exactly, in the other they are 2·4d. Yet the higher yield per ton in the latter case, although purchased at a higher cost for coal and wages, is sufficient to redeem the cost of the gas in the holder. It may be argued that for purely "carbonizing" purposes, the difference in volume might be compensated for by the value of the residuals obtained. But my point is that if the producing power of the retort is impaired by the peculiar method of handling the materials, the loss is absolute so far as the efficiency of the plant is concerned, and the evil must be struck at its root.

The complaint that, with machine-broken Scotch common coal, distillation does not proceed so rapidly as with carefully hammer-broken splints, is not without foundation. In the case of hammer-broken splints, the resulting dross is suspended in thin layers upon the large pieces in the retort, and no inconvenience is experienced. With machine-broken splints on the other hand, though the coal is more uniform in size, no large pieces remain as carriers for the small, and nothing short of a sharp heat will effect distillation within the time-limit to which we have been accustomed. In my own case, I find it more profitable to get the coal broken at the pit, and delivered in the form of clean nuts. The quality is not inferior; the price is less; and the results are better than with machine-broken splints. The nuts are dropped direct to the boot of the elevator through a bye-pass; and the breaker is reserved for cannel, which it reduces to the uniform size of a hen's egg without making an undue amount of small.

With 112 retorts at work in December last, carbonizing wages—with the aid of West's manual charging and drawing machines served by one coal breaker and elevator, but without coke-handling plant—amounted to 1s. 4·5d. per ton of coal carbonized; and in November, with 96 retorts in action, the cost per ton of coal carbonized was 1s. 5·4d. The average carbonizing wages over the year amounted to 1s. 10½d. per ton, and 2·2d. per 1000 cubic feet of gas made, including the discharging of coal into store, coal trimming, charging, and drawing, coke wheeling, and trimming. These figures are not low; but they may be regarded as moderate, keeping in view the fact that stokers' wages are respectively 8·07d. and 7·53d. per hour, according to grade, and that for a large part of the year the number of retorts in action is not sufficient to keep a set of men fully employed.

In conclusion, I am persuaded that in the development of the retort-house we have ample scope for the exercise of our surplus energy, and that—for the effective carbonization of coal and the economical production of gas—a well-ventilated retort-house with retort-settings constructed on the most practical scientific principles is an absolute necessity, and that works not so equipped are severely handicapped. Without such a retort-house, the profit-earning power of the concern is not sufficient to yield an adequate return upon the capital employed, as the result of which the selling price is high, while the dividend is low, and the plant is more or less starved. A year or two of high prices for coal and low returns from residuals, and the resources of the undertaking are exhausted, in consequence of which the development of business is hampered and enterprise is choked.

In small gas-works, the regenerative setting is comparatively a labour-saving appliance; and in every retort-house where machinery can be employed to advantage, its introduction will not only result in largely increased profits and better conditions of labour, but also in a higher state of efficiency in the gas-works generally.

Discussion.

On a proposal being made that the discussion should be postponed till after the visit of the Association to the gas-works,

Mr. M'Lusky said he was afraid there was a misunderstanding. They would observe that the paper was upon a proposed scheme, which he was going to have, he hoped, the benefit of their experience upon. He would be very pleased to have a really candid criticism of it. The plant for coal and coke handling had been in contemplation, and had been spoken about for the past six months. Whatever they did in Perth, they did not hurry. When this plant was finished, he hoped it would be worth seeing; but it was not to be seen yet. The retort-house was in action; and the settings of his, as shown, were in action, and would be seen. As he had said, the secondary air-flues were sandwiched between the waste-gas flues. They would see the bricks which he had spoken of. Although his name was not on them yet, he hoped it soon would be. There were other things which, he was quite sure, not one of them would claim as his own; but if there were any little bits he had copied from them, perhaps they would acknowledge his high appreciation of their ability.

Mr. W. R. Herring (Edinburgh) thought they must be all agreed that the Perth Gas-Works, and the Perth gas machinery in particular, were in the forefront as regarded modern methods of coal carbonizing. He thought, in the earlier part of the paper, that there was more of this scheme in existence than appeared to be the case. However, on the face of it, they must compliment the author—the designer—on what he proposed doing. The scheme was a most excellent one, as far as he could see; and the only question which was of importance for Mr. M'Lusky to consider was as to whether he could get an adequate return on the capital involved. They all knew that at the present day they must adopt machinery, not only in gas-works, but in every other process under the sun where they could possibly save labour. But to go madly ahead and put in machinery simply because it was fashionable, and find that they were spending more on the effort than beforehand, of course, was not wise. So the first question was, How much could they save—how many men's labour could they do without? Personally, he thought they were justified in putting in machinery, even where they could get no actual saving. He thought they had a duty to themselves—to mankind—to employ machinery instead of muscle. Man was not born to be a physical creature merely. He had a brain; and they should use his brain in preference to his muscle wherever they could. He did not know that he could say much on the merits of this subject. It was purely a commercial question. Mr. M'Lusky had gone into it; and he said it would pay. If that were so, he had not the slightest hesitation in recommending him to adopt what he proposed. It seemed to be most carefully thought out, and a scheme which, he was sure, would fully meet the requirements.

Mr. W. Fairweather (Kilmarnock) said that, in common with Mr. Herring, he was very pleased to be there to hear the paper read. He was rather interested in something of the same kind just now; and it gave him very great pleasure to see the arrangement. So far as he could judge, everything was in good order; and he had no doubt it would be a profitable concern. He was very much obliged, he might say, to Mr. M'Lusky for his paper, because it had opened up a new field to him, which he believed he would have some pleasure in taking advantage of.

Mr. D. Robertson (Dunoon) said he had listened with very great pleasure to Mr. M'Lusky's paper. He had given it in his usual lucid and able style; and he was sure they had not only listened with pleasure to his remarks, but had admired the splendid diagrams he had put up for their observation. There was no doubt that, in works of sufficient size, the employment of machinery was a benefit; but there was the difficult question as to when a works was of sufficient size. For instance, if works were on the border-line, it came to be a question for the gas

manager whether he would adopt stoking machinery or continue the old hand labour. There was no doubt that what someone had said regarding the man with the shovel and the barrow was perfectly true. If they had a good stoker, a careful man, and a man who used his head to a certain extent along with his hands, they had an instrument which was very hard to beat. Sometimes he thought that stoking machinery did not do the work—that they did not get the same results as they obtained from good hand stoking. He had seen retorts charged and drawn by machinery; and he had to admit that the results—at any rate, to look at—were not so good as they could secure with hand stoking. Of course, there was always the humanitarian plea put forward that man was not exactly to be used as a machine. As Mr. Herring had very aptly put it, a stoker had a brain as well as a muscle; and it was their duty to relieve men of arduous labour to as great an extent as they could. But, after all, Mr. Herring admitted that the question was one of £ *s. d.*—that, provided it paid to employ machinery, they were bound to do so. He (Mr. Robertson) thought this was their position. They were not there as humanitarians or philanthropists, but as gas engineers; and they must make their works pay, if possible, though certainly not at the expense of their fellow-men. He thought the Association should congratulate Mr. M'Lusky on his excellent paper; and he had no doubt that, when the scheme was put into practical use, it would work satisfactorily. He wished him all success.

Mr. A. Wilson (Dawsholm) was sure they were all very much indebted to Mr. M'Lusky for the lucid manner in which he had put forward the claims of doing as much as possible of the labour of a gas-works by machinery. As one who had had a good deal of experience with machinery in gas-works, he certainly thought that Mr. M'Lusky was on the right lines, and that his experience, after he had got his works equipped and properly started, would be that it would be a benefit both to the concern and to himself. At the same time, he would just like to warn him that, if he wanted success, he must give the whole scheme a good deal of personal attention, not only in the putting of it together, but in the carrying of it out. In a great many works where they had adopted machinery, good results were not obtained because the plant had never had any personal attention from those who had brains to induce those who had the muscle to work it properly. In every case, he thought, where machinery was adopted—and especially where things had been worked for so long on the old rule-of-thumb line—it was necessary that those who had charge of the working should see that their ideas were thoroughly carried out. If this were done, he thought there would be a great deal more chance of success than otherwise. Mr. M'Lusky's proposed scheme was on the right lines; and his communication would form a very satisfactory addition to their proceedings. Mr. M'Lusky had given them what he considered was the main object of gas working and of gas engineering; and he had put it very clearly before them. He wanted to secure the best possible results, and he saw that the best results were shown by the price at which they could sell their gas. This was the main thing in the end. If they could give the men easier work, and still get the same result, and be able to sell gas cheaper, he thought they ought to adopt machinery as far as they could. In the old days of hand stoking, they had certainly a very fine class of men; but he thought the men where they had machinery in use for some time were better still. They were easier to manage, they liked their work better, and they took a great deal more interest in their labour. For these reasons, he thought it was advisable to adopt machinery. Even if there was not a great deal of saving, it was better to have machinery, if possible, on account of the men. It was better to have machinery, so that the men would have the benefit of it as well as the concern. One little point Mr. M'Lusky had brought in was the V-shaped joint with a V-shaped brick. He thought he could tell him it had been in use for a very long time, so that if he liked to put his name upon it he was entitled to do so; but if he went to Dawsholm, he (Mr. Wilson) could show him that they had employed these bricks for ten or twelve years. At the same time, he recommended him to adopt the system. It was a very good idea, and had proved itself to be so in practical experience. Mr. M'Lusky put the regenerative principle in use in heating gas-retorts very clearly; and what he said about the necessary points, he also put very clearly. If they understood the principles of regenerative firing—if they got the principles properly in their head—there were a great many ways of arriving at the same results. The main thing was to understand the principles, and what was required; and there were a thousand ways of reaching the same end. Everyone, of course, thought his own baby the prettiest; but if they secured good results, that was the main thing.

Mr. Fairweather asked Mr. M'Lusky about the V-shaped bricks. In his works, he said, the division-walls between the secondary air and the waste gases were made of bricks laid on edge. They were 3 inches thick; but laid on the flat they would be 4½ inches. This appeared to him to be taking up a good deal of unnecessary space—space which might be utilized in the enlargement of the flues. Of course, it could not matter very much; but in looking at the brick, he was thinking that if the V were put on edge the work might be more effective. Mr. Wilson's remarks reminded him of a story. Some two or three years ago, in connection with stoking machinery, he happened to be in Tradeston one day; and, examining the drawing machine, he put the question whether Mr. Wilson thought it would be an advantage to instal the machinery in the Kilmarnock Gas-Works. The answer was that it would pay, supposing it were stuck up against the wall, and was never worked at all.

The President said that was quite correct, because at that time there were great difficulties in large gas-works. When the machinery was there, they had the best side of the argument, because they could do without so many men. But machines would not pay unless they operated them. Some works had put too much money into machines, and had not the number of retorts to keep them going. In his works, the machines operated from 44 to 46 retorts per hour each. They were in settings of twelves. But when they came to keep them going half-time, they certainly could not pay, unless by hanging them on the wall and using them as a terror.

Mr. F. Waddell (Broughty Ferry) thought that Mr. M'Lusky's scheme was on the right lines. If managers of small works had not gone in for such plant, it was, in his opinion, due, to a considerable extent, to their not having inquired into the first cost of the results. He thought Mr. M'Lusky was perfectly safe in adopting coal and coke handling plant. He had been considering the matter for Broughty Ferry, where the make was not one-half what it was in Perth. They had so much coal and coke to handle, that it necessarily meant a great deal of manual labour. He had looked carefully into the matter, had got the cost of the machinery, and, for that part, had the machinery ordered. The capital charge for it would be a very small matter—about £30; and he had no doubt whatever that there would be a very big saving in having conveying plant. It might be pointed out that it was manual stoking machinery that Mr. M'Lusky had, which would not require extensive plant. As far as equality of work was concerned, he was inclined to think he had seen as good work done by manual stoking machinery in Perth as they would see in almost any works where there was hand stoking, and better, he should think, than in most of them. As to regenerative settings, he was rather like Mr. M'Lusky—he had his name on some of them; and in designing the setting he went very carefully into the matter of the jointing. He did not think anyone had been troubled with short-circuiting through horizontal joints or through tubes. It had invariably been through the joints that were perpendicular; and it did not matter whether they had a V-shaped or a rebate division, it struck him they would get short-circuiting. But he considered the V-shaped joint was not nearly so good as the rebate, in a tile which was simply a square. In the latter case, they had the division-walls moving longitudinally, and when the setting cooled down the bricks shrank a little, longitudinally, with the result that there was a space left between them. With a V-shaped joint, he was somewhat afraid they would find a space when the bricks shrank; in the case of a rebate, which had parallel sides—the sides being parallel with those of the division-walls—there would not be a shrinkage to the same extent in the sides. There was, he considered, a good deal of room for thinking out ways of taking advantage of the entire surface of the waste-gas flues, and ultimately they arrived at an arrangement in which the whole outer surface of these flues was exposed to secondary air on its way to the combustion chamber, and in this way they avoided perpendicular joints. There was not a joint of this kind in the setting; and thus there was far less chance of short-circuiting. The results he had—something like 10 cwt. of coke sold per ton of coal carbonized—spoke very well for drossy matter. He omitted to say, in connection with the plant he had put up, that the whole of it, including the retort-bench and the conveyor, would not cost more than £50 per mouthpiece. It was fitted up for a bench of 32 retorts.

Mr. J. M'Gilchrist (Dumbarton) said he thought the defects of Mr. M'Lusky's paper were, first, that he spoke of the inclined and horizontal systems of heating and working retorts, and gave no reason why he had adopted the scheme before them. It would have been interesting to them, seeing that they did things so well in Perth, if Mr. M'Lusky had let them know why they had decided upon the horizontal system, after there had been so much discussion in connection with the other. No doubt Mr. M'Lusky had gone into the figures, and would be able to tell the meeting the extent of the gas-works suitable for the introduction of the excellent system he had put before them. He would also like Mr. M'Lusky to state whether it was on the ground of cost or efficiency, or both, that he preferred the horizontal to the inclined system.

Mr. W. Ewing (Greenock) said Mr. M'Lusky had mentioned horizontal retorts *versus* machines. Machines were an advance on the old system of hand labour, which, of course, they had in operation in many gas-works. Inclined retorts, in his opinion, were an advance on machines, both in actual cost and in efficiency. The next advance would, he thought, be to have vertical retorts, and the taking of the greatest possible quantity of residual products out of the coal, considering they did not now require gas of high illuminating power. Mr. M'Lusky's key-note was simplicity and efficiency consistent with economy. There were two points in a retort-house which should be very accurately and carefully considered. One was the financial, and the other the human account. A good stoker and a good retort-setting were very difficult to beat—in fact, they could not be beaten, so far as actual efficiency was concerned. The human account was, in his opinion, the most important one in the retort-house; and all retort-houses of a size suitable for having either manual or power machinery should have it at once. It did not matter though it might cost 2d. or 3d. per ton more. If they

had a complete and efficient installation of stoking machinery it might pay, provided they had works making from 30 million cubic feet upwards. But they must carefully arrange everything in a fashion to suit the machinery, because great difficulties arose where, without consideration, it was shoved into a gas-works. Stoking machines were certainly great labour-savers; but there were local conditions which must be taken into consideration before they thought of going in for machines. First of all, they must have ample storage accommodation for coal. One of the greatest drawbacks in connection with machine stoking was the bad condition of the coal, which, in his own case, was something extraordinary—due particularly to the local conditions and the climate, which was a very wet one. The coal storage was very small compared with the size of the works, and amounted to not less than 1s. per ton, under the very best circumstances, of a dead loss, working with stoking machinery, as compared with the best hand labour, even under very unfavourable conditions. But they were remedying these defects; and in time, he was confident in saying, he would be able to carbonize a ton of coal for 1s.—that was to say, with the installation now being completed. It consisted of a hot-coke conveyor, coke-handling plant, and a complete coal-handling plant. Everything was to be done automatically—even the removal of the coal from the store. A scheme of this description took a long time to carry out, as Mr. M'Lusky had stated. He had shown them a very simple setting of retorts, and, he (Mr. Ewing) was confident, one that would do away with the difficulty of short-circuiting, which was a constant source of trouble in a large number of works. Moreover, it would only cost about the same price as an ordinary one—he should say only about £10 more per setting. He should estimate that 100 retorts on this principle, without any ironwork, could be erected for £1000, on the ground floor. Perhaps Mr. M'Lusky would correct him if wrong; but he spoke from experience in saying this. He had erected retorts on a similar principle, with a deeper producer; and they cost £10 per mouthpiece, exclusive of ironwork. The scheme of coke handling before them was a very complete one. In his own case, he estimated a saving of not less than 6d. per ton, after all capital charges had been paid. The double handling of coal in a retort-house, after it had been broken, increased the cost of labour. The carbonizing costs, as shown by Mr. M'Lusky, indicated that even an installation of manual stokers for a place the size of Perth was too large. It varied from 1s. 4½d. to 1s. 10½d. per ton. Hand stoking in the best works was done for 1s. 10d., with a maximum efficiency all round. He would like to ask Mr. M'Lusky if he found any disadvantage in working with a stage floor. Would he consider it more economical if his settings were constructed on the ground floor? He (Mr. Ewing) was a strong advocate of ground-floor settings, because he knew there was great disadvantage as well as extra cost in connection with stage-floor settings—of course, peculiar to local circumstances. He had both systems in operation in his works, and he found superior results from the settings on the low level, and a reduced cost per ton—showing how careful one should be in condemning any plant, and how careful his predecessor had been to plan the works. Their old works were built, he believed, in 1873; and the arches were still standing. He put in simple retort-settings, which could make, under fair circumstances, with dry coal, at least 10,000 cubic feet of gas per mouthpiece. Mr. M'Lusky mentioned that it suited him best to work with nuts and small coal. From this, he (Mr. Ewing) inferred that he used a proportion of cannel and shale for enrichment. Would he say what his cost of coal was per ton, and what was the cost of carbonizing with hand labour formerly? And would he give them the cost of the whole installation of his complete coke-handling plant for the 112 retorts which he was now building—the coke-handling plant separately? If he did not consider it too impertinent a question to ask, he might perhaps give them the cost of the former installation. He (Mr. Ewing) thought that for this installation Mr. M'Lusky deserved the highest praise that could be given to a gas manager, for it was a piece of fine workmanship. Everything had been done with the greatest care; and he was confident it would be a thorough success.

Mr. M'Lusky, in replying upon the discussion,said, in regard to what Mr. Herring had stated in reference to the commercial part of the scheme, he was very much obliged to him for drawing attention to this phase of the question, because in his view no scheme was labour-saving unless it could be shown that it would not only meet interest and depreciation, and redemption of the initial cost, but do it in a very short time, because nearly all conveyors and elevators, and mechanical appliances of this kind, could not be regarded as permanent plant. He had shown that his scheme would pay interest, depreciation, and redemption of initial cost within five years. If this should be accomplished, the scheme would have paid for itself. They had competitive tenders for the plant, and the firms tendering had undertaken to maintain it in an efficient state of repair for 5 per cent. for any time, and particularly for five years. They would then have recouped themselves for their outlay—in fact, they would do it in a year less. He was also obliged to Mr. Fairweather, to whom he had been indebted for valuable hints, for his generous remarks. Mr. Robertson had referred to the value of hand labour. This was a point which, he was sure, was appreciated by everyone. Hand labour properly applied was the recognized method of charging and drawing retorts, up to the point where it could successfully compete with machinery. Mr. Wilson said the men liked their work better with machines. This had been his own experience. His opinion was that the status of the gas stoker was raised when machinery was introduced, because they could command the best men in the market. His idea was that no stoker should have less than £2 per week, or work more than 52 hours for it. He would be disappointed if this did not take place in Perth within two years. They would observe that he mentioned in a jocular way that his name was not on the bricks, but he would like to say that Mr. Wilson's V joint was a very different one from his. In Glasgow they used two V's, brought together, and a fire-clay filling. In his case there was no fire-clay filling. He put a groove in the one end and a tongue on the other. Mr. Fairweather referred to the brick-on-edge in the flues. They would observe that this was about the widest oven found in Great Britain; and there was thus ample space for flueing. The producer was 3 feet wide. It was more satisfactory with the bricks on the flat. He found there was a great deal of building under the stage-floor; and he thought he might as well build it in flues as in solid walls. The recuperation was so great that they could see the daylight coming down the chimney; so that there was not much waste heat going away. Mr. Waddell referred to charging by machinery. He thought the charging in Perth was very good, because it did not matter whether they were using dross or large coal, the machine carried the coal in, and laid it down quite evenly. It was not a push machine. Mr. Waddell also referred to the rebate joint. He might point out that in his case there were five joints. It would be a very automatic brick indeed if it happened to draw out straight. When a brick drew, there was a weight upon it; and the tendency was to dispose the brick to the right or left, and it was thus bound to rest upon some other brick, just at the joint. A rebate brick division was exactly like ninepins; they were set up loosely, and they fell before the bricklayer had his covering tile on. They were very seldom tight. He did not think he would be well advised to go into the question of cost, because this might introduce a conflicting element, and be giving away contractors' prices. Their Contractor at Perth was a local builder, of high standing. He was the lowest tenderer for the work, and they had saved a very large sum, to begin with, by employing him. The cost per mouthpiece was much less than with a stage-floor; but he did not think it would be wise of him to give them the price. Mr. M'Gilchrist asked the reason why he did not adopt "slopers." Well, he was far too little a man to adopt them. He hoped to do so some day, but not yet. He would give them a better reason. They had a bench of 112 retorts at Friarton, on the horizontal system; and if they had put in the other 112 retorts as slopers, the men would have required to spend too much time going up and down ladders to serve the two systems. When they had horizontal retorts in use, it was better to continue the system, because the men had become proficient at their work with them. In winter, the men charged and drew 42 mouthpieces in 36 minutes. They could not employ inclined retorts in summer; and if the men were charging horizontals in summer and inclines in winter, they would not do their work well. There was a distinct disadvantage with a stage-floor in summer, because they required a man below, attending to the fires, and someone above to charge and draw the retorts. There was the additional disadvantage that if they were to draw the coke on the same floor as that on which the men were working, they could never charge and draw 42 retorts in 36 minutes, because they would be tripping over each other. At present the coke went out of sight, and the doors were not so long open as they would otherwise be. He did not think he should enter any more into the discussion, but he would be very pleased to answer any further questions, if desired.

SOME EXPERIENCES WITH CONDENSING PLANT.

By W. Currie, of Alexandria.

[A Paper read before the North British Association of Gas Managers.]

The experiences which I wish to submit to you to-day deal, I am afraid, with conditions which many will look upon as rapidly becoming obsolete in the business of gas supply. The trend of opinion is so obviously in the direction of what is called "low-grade gas," that to speak or write of the difficulties of maintaining a supply of gas of (say) 25-candle power must, to an increasing number of you, appear as distinctly behind the times. There can be no doubt, however, that so long as we are engaged in the production of a gas consisting largely of the hydrocarbons, and not merely a producer gas, condensation must, for economic no less than for practical reasons, remain a subject of interest to everyone concerned with the work of gas manufacture, no matter what the conditions of supply or the quality aimed at may be.

As the result of experience, and also of expert investigation, we are at the present time in possession of a number of generally accepted theories on the subject of condensation. These have reference principally to the best methods to use, and the proper precautions to observe, to ensure the efficient and thorough removal of all condensable matter from coal gas without injury to those constituents which it is desired to retain in the diffused

or gaseous state. It is doubtful, however, if, with all our extended knowledge of the subject, this branch of our work always receives the attention it merits. Condensation as usually carried on by many of us is, I am afraid, treated very much as a matter of course, with a consequent resultant loss of much illuminating matter that might, with proper precautions, be retained in the gas and sent to the consumer.

The experiences which, with some hesitancy, I venture to recount to you, have nothing of the unique to commend them. They belong entirely to the everyday common-place order of things. The purpose I hope to serve by a rehearsal of them is to emphasize the necessity of having our condensing plant entirely under control, and also that we may cull from the riper experience of many present who have made a more lengthened study of the subject than I have.

The nature of the industry carried on in the district which I represent has in the past rendered gas of at least 25-candle power almost a necessity; and perhaps even a gas manager never thoroughly realizes the extreme difficulty of maintaining a supply of gas of this quality with any degree of uniformity until he has an examiner to satisfy, who is privileged to call at any time without previous notice. To anyone so situated, the vagaries of our delightfully uncertain climate are always a fruitful source of trouble and annoyance. More recently, however, these troubles have been accentuated by the growing scarcity of cannels and shales suitable for enrichment purposes, and the high prices ruling for coal of all classes during the past season or two. To be subject to the visits of an examiner at stated times may be trying enough; but when to the visits is added the element of uncertainty, you will readily perceive that the position is one for extreme watchfulness, to ensure the quality being maintained with any degree of uniformity. During the period from Oct. 1 to March 31 in each season, we have thus found it necessary to take readings of the photometer twice a day, in addition to keeping a careful record of the atmospheric and other changes likely to have an influence on the quality of the gas produced. Some of the experiences arising from this system of observation have been remarkable; and these form the subject of my present contribution.

That you may appreciate at their proper value the points I wish to set before you, allow me, in a word or two, to describe the plant in use and the method of working. Our maximum requirements of 150,000 cubic feet were, during several seasons, obtained by the use of two ovens of six retorts each, on Hislop's regenerative system, in conjunction with an oven of three retorts on the old direct-fired principle, ascension-pipes of 6 inches diameter, hydraulic main of usual ⊔ pattern, with valve for the withdrawal of heavy tars and to ensure the maintenance of a liquor seal for dip-pipes; foul main of 12 inches diameter passing from the retort-house, along the outer wall of the purifying-house, to a distance of 40 feet before entering the condensers. There are two sets of condensers, both of the ordinary vertical type; the one consisting of sixty-four 8-feet lengths of 5-inch pipe, the other of twenty 12-inch pipes 14 ft. 8 in. long—the available condensing surface, exclusive of foul main, being over 1560 square feet, or fully 10 square feet per 1000 cubic feet per diem. There is a tower scrubber having two divisions; a reciprocating exhauster of 10,000 cubic feet capacity; three purifiers of fairly ample area; and a gasholder of 120,000 cubic feet capacity, situated about 100 yards from the works. These represent the main features of the apparatus in use. In addition to being of very manageable proportions, the plant is in excellent order, and, therefore, all the more likely to give reliability to the different changes noted.

It is scarcely necessary, perhaps, that I should go into details in regard to the material in use, beyond saying that this consisted of cannel and shale in such proportions as to yield, under normal conditions of temperature and pressure, a gas from 24 to 25 candle power in practical working. To compensate for an occasional or prolonged fall in the atmospheric temperature, we had recourse, in the usual way, to an increased use of shale or first-class cannels. Despite this, however, we frequently experienced, in the course of our systematic testing, a sudden falling off in illuminating power to the extent of 3 or 4 candles, which seemed quite inexplicable. Every possible source of trouble and error was in turn examined, without revealing the cause. Our daily requirements being, on the average, about 150,000 cubic feet, with fifteen retorts in use, it was necessary that we should not only have good material, but also that good working heats should be maintained. Time and again, when troubled with a serious falling off in quality, the risk of over-carbonization, with its liberation of hydrogen and consequent reduction of illuminating power, presented itself to my mind, and every effort was made to prevent the charges being wire-drawn, and also to see that, as far as possible, overlapping of the charges was taking place, so as to ensure uniformity in the quality of the gas produced. Moreover, the fact that we were working three-hour charges discounted the possibility of our trouble being due to decomposition of the hydrocarbons in any appreciable degree.

After a time, it occurred to me that the condensers were in some way responsible for these periodic fluctuations in the quality of the gas and the troubles attendant thereon. Theoretically, our condensers seemed to me to be right; and although we had quite the maximum surface believed to be necessary for the efficient removal of all undesirable vapours, I was disinclined to think that any injury would come to the gas—assuming even a slight excess in condensing power beyond our actual requirements. The heavy tars are not allowed to travel with the gas, but are drawn off from the hydraulic main by a separate pipe and valve. The richer vapours diffused in the gas are not, therefore, subjected to the absorbent influence the tars might have upon them. The fact also that many advocate the desirability of subjecting the gas during the process of condensation to the lowest temperature it is likely to be exposed to, seemed assurance enough that the condensers could not be the cause of the trouble experienced. Nevertheless, I determined to make a few experiments, with the view of ascertaining how matters stood with me in this respect.

As a preliminary to the experiments, I procured several thermometers, and had them fitted at the following points—viz., outlet from hydraulic main, inlet to first condenser, inlet to second condenser, inlet to scrubber, outlet from scrubber, and at the station meter. I also had set in a convenient part of the works a maximum and minimum thermometer, so as to obtain a record of the extreme variations in the atmospheric temperature from day to day. On the introduction of the thermometers, I was surprised to find that, so far as the actual cooling of the gas was concerned, this was almost accomplished by the time the gas had reached the outlet of the first condenser; being reduced from 150° Fahr. at the outlet of the hydraulic main to within 3° or 4° of the temperature of the surrounding air when this was as low as 50° Fahr., or under. I further observed that my trouble with the illuminating power began when the temperature at the outlet of the second condenser got down to 40° Fahr. As the temperature at this point on extremely cold days gradually got near the freezing-point, I found it sometimes almost impossible to maintain the gas at 20 candles, even with a greatly increased use of shale and other enriching material. On the other hand, an increase in the atmospheric temperature, with the consequent effect on the condensers, caused such a rapid rise in the quality of our gas that the difficulty of obtaining anything like uniformity in the circumstances was very great.

Having seen that the mere cooling of the gas could be accomplished so readily, I determined to try the effect of throwing one set of condensers out of use altogether. The result of this was distinctly advantageous in so far as obtaining greater uniformity in quality was concerned. Alas, however, the change speedily involved me in other troubles, through having portions of the tar carried forward and deposited in the scrubber and in other parts of the purifying plant. This experience indicated quite clearly that, for the removal of the tarry vesicles which are carried forward in the current of gas, the entire condensing plant at our disposal was required. On the other hand, however, the prolonged exposure of the gas to the extremely low temperatures which this occasionally involved, seemed to have a distinctly deleterious effect on some of the hydrocarbon vapours which it was most desirable should be retained in the gas.

In view of these conclusions, I resolved to try the effect of protecting the gases from the influence of very low temperatures by partially covering in the condensers with light boarding. To have the temperature of the air in proximity to the condensers also somewhat under control, several rows of steam-piping were placed between the condenser pipes. For the regulation of the temperature of the water in the scrubber, a jet of steam was introduced there also. These arrangements proved very successful in preventing the gas being subjected to the extremely low temperatures before experienced, and were also most effectual in relieving us from the trouble arising from the serious and sudden variations in the illuminating power of the gas. On this latter point I am quite satisfied, although I must confess that the result came as a surprise to me, having certain preconceived notions, to the effect that any condensable vapours remaining in the gas on leaving the condensers would be sure to come to rest either in the gasholder or in the mains.

In the light of these experiences, I have no hesitation in saying that it is quite impossible to maintain a uniform quality of gas unless our condensing apparatus is absolutely under control, assuming even that all other conditions in respect of material and working are as nearly equal as it is possible to have them. It is not enough, either, that a section of our condensing plant should be thrown out of action altogether in colder weather. In my experiments, I found it much easier to get rid of the tarry matter suspended in the current of gas when the temperature of the surrounding air was 50° Fahr. and over, than when it fell to (say) from 32° to 36° Fahr. It is necessary that the gas should be subjected to as much (if not more) friction for the removal of the undesirable vapours when the temperature is at 32° as when it is at 60° Fahr. In the one case, however, the gas suffers very materially unless protected from the influence of cold; in the other, it has a chance of some slight gain by the re-absorption of vapours thrown down at another time.

I have stated that during the period to which these observations refer we were working with very good heats. This was imperative to enable us to make the necessary amount of gas without bringing more retorts into action. We were also careful to avoid undue prolongation of the charges, so that decomposition of the olefines might be prevented. I would, however, offer as a point for your consideration whether we were not, to a very great extent, having decomposition of the olefines, with formation of the denser hydrocarbons of the benzene series, and the increase of volume consequent on this change. This, I am persuaded,

was, to some extent, happening; and so long as the atmospheric conditions were favourable to the retention of this benzene in the gas, we profited by its well-known enriching properties. On the other hand, however, when the conditions were unfavourable, our loss was distinctly greater than if the decomposition of the olefines had been as far as possible avoided. That we were having high temperature products formed in abundance was amply proved by the presence of naphthalene in the colder part of our condensers, and also by the abundant traces of prussian blue in our oxide of iron. Another point I should like to mention in support of the opinion that we were having benzene formed, is this: I have frequently observed, when the heats were a little higher than usual, that not only was the volume of the gas increased, but the candle power was also higher than at other times with a lower yield from the same material.

Briefly, then, my experience was the common one that, under the influence of extreme cold, some of the valuable enriching vapours contained in the gas were to a considerable extent thrown down and lost. This was at times happening to such an extent that a greatly increased use of shale or rich cannel only partially compensated for the loss in illuminating power incurred in this way. The more effectual remedy was the regulation of the temperature at the condensers and the maintenance of the proper degree of equilibrium between the absorbent power of the tarry vapours and the carrying capacity of the gas. It has been demonstrated very clearly that a moderate temperature is the most suitable at which to work cannels and shales so as to obtain the largest amount of enriching value from these materials. In order to utilize the rich vapours obtained in this way to the best advantage, it is necessary to have a poor gas in readiness to absorb the vapours while these are still at a high temperature. It seems to me, therefore, that the practice of endeavouring to maintain the illuminating power of gas by an increased use of rich coal, when the carrying capacity of the gases has been reduced through extreme cold, is indeed a wasteful one, and not in the interests of either the gas producer or the gas consumer.

There can be no doubt that all the advance possible on the present methods of treating our raw materials must be in the direction of using carbonization temperatures exactly suited to give the best results from the particular material dealt with, and also as far as possible to prevent the building up of those secondary products inside the retorts which not only represent so much loss to the gas maker, but which are also frequently the occasion of much trouble and inconvenience. The question, however, which I would like to put before you pointedly is as follows—viz., "Is it necessary, for the purpose of obtaining the best possible results under present methods of working, from the coal or cannel we carbonize, that the temperature of condensation should have any definite relation to that of distillation; in other words, do the high temperature products of the benzene series suffer more from exposure to low temperatures than do the paraffins or the olefines?"

I am of opinion that such is the case. With the almost universal use of high heats in the retort-house, there is no doubt that the resultant products from the distillation of coal are, to a great extent, different from those formed at the lower temperatures that formerly served. When we recollect, further, that most of those high temperature hydrocarbons which are of any value to us are liquid at the ordinary temperature, although possessing high vapour tensions, the necessity of guarding against their possible loss in the condensers becomes very urgent indeed. It may be that it is more advantageous, in many respects, to carbonize the richer coals at moderate temperatures; but so long as we have a striving after volume by means of high heats, we shall have these substances formed; and, being formed, it is well that we should guard against their possible loss.

I am aware that my impressions on the subject of condensation are here put before you in much too indefinite a form to be of any great practical value. My plea is that at the time of noting the changes here set forth, I had no intention of using them for any other purpose than my own guidance and satisfaction. In point of fact, I am in the rather selfish position of hoping to gain more information from many of those present than of adding anything to the general knowledge on this subject. One point, however, I can emphasize from my experience, and that is the great importance of having some ready means of controlling the action of our condensers to suit the different seasons and our constantly varying requirements.

THE USE OF OXIDE OF IRON AND LIME IN PURIFICATION.

By Thomas Lighbody, of Renfrew.

[A Paper read before the North British Association of Gas Managers.]

It is not my intention to convey to you by the title of this paper that it is a scientific treatise on purification, but only that it is a record of every-day working results, on commercial lines, with a combination of materials.

The first stage in the removal of gaseous impurities is scrubbing and washing with the liquors condensed in the hydraulic main and condensers. These liquors, though containing some ammonia, sulphuretted hydrogen, and carbonic acid, are not fully saturated, and are capable of absorbing an additional quantity of these impurities. In my case they are collected in a separate tank, and used in the first half of a tower scrubber. The gas, in passing through the second half, is washed with clean water. Working in this manner, I consider I am deriving the greatest benefit possible from the plant at my command.

Until the year 1900, all our purification was done by lime; but, owing to the difficulty of disposing of the spent material—there being no demand in the district, and it being a commodity that is invariably looked upon with suspicion when the filling up of waste ground is required—I was brought face to face with a serious problem. While recognizing the fact that my purifying plant was working up to its maximum capacity in winter, and that it was not specially constructed to deal with a combination of materials to the best advantage, I ventured upon a small parcel of oxide as a trial, and commenced experimenting with it, so as to learn something as to the best means of using it with the plant at my disposal.

I had trials made with oxide and lime in alternate boxes—with oxide in the first box, lime in the second, and oxide to finish. This I had to abandon, as one-third lime did not eliminate all the carbonic acid; and at the same time the sulphur compounds in the finished gas rose to such an extent that a continuation of this method was not warranted. My next step was to reverse the order of things, and use boxes of lime, oxide, and lime. This, so far as the carbonic acid and bisulphide of carbon were concerned, was satisfactory; but it did not give the results as to the quantity purified per box, or reduce the cost per 1000 cubic feet to the point desired.

My next effort was to use oxide and lime in each box to the extent of 60 per cent. of oxide and 40 per cent. of lime; care being taken to place sheets of open texture canvas between the oxide and the lime. This system commended itself to me, as it met the requirements as to cost and quantity purified per box, and also as to the bisulphide of carbon in the purified gas.

At the beginning of the last financial year, I had a fresh supply of oxide delivered. This oxide, I may say, did not show the same high percentage of iron as the first quantity experimented with, and gave the following analysis: Ferric hydrate, 66; organic matter, 18; silica, 10; other constituents and loss in analysis, 6. This oxide proved that the purifying value depends more on the state of hydration than on the percentage of oxide of iron; in other words, an oxide may show a high percentage of iron and still be an unsuitable purifying agent. It has given satisfactory results; and, worked as previously described, in the proportion of 60 per cent. of oxide and 40 per cent. of lime, it took up the following percentages of sulphur per run:—

1st change	20 per cent.	4th change	52 per cent.
2nd ,,	36 ,,	5th ,,	59 ,,
3rd ,,	45 ,,	6th ,,	66 ,,

These results, from the combination of materials, I consider show very good service. The average quantity of purified gas per cubic foot of material has been 7015 cubic feet, with a variation of from 4535 to 11,572 cubic feet of gas per cubic foot of material, according to the quantity of gas manufactured per day. Comparing previous purification with lime only, the average results were 3503 cubic feet per cubic foot of material, with a variation of from 1889 cubic feet to 4725 cubic feet per cubic foot. These figures would be incomplete without a comparison of cost. For the past financial year the cost for purification was 0·302d. per 1000 cubic feet; the cost in the previous year being 0·942d.

The next point of comparison is the amount of bisulphide of carbon in the purified gas. Comparing the two systems of purification, it is a well-known fact that, using lime only, this impurity is, when the purifiers are of large area, kept remarkably low, but when the reverse is the case it is not always so. In my personal experience, with purifiers working to their maximum, I have found this impurity to be as high as when using the combined material. During the past twelve months, the average amount of bisulphide of carbon in the purified gas has been 7·32 grains per 100 cubic feet, with a minimum of 4·18 grains and a maximum of 8·75 grains. These results are based on weekly tests; and while no effort was made to keep this impurity down, it is well under the statutory requirements.

With regard to the use of air as an aid to purification, this is a contentious question. I have used 1 per cent. of air right through, and, without having made any special test, I have never had any difficulty in keeping up the illuminating power of the gas. It may be a matter of the point at which the air is introduced, or a matter of air in unpurified *versus* purified gas. At this point I may be allowed to refer to the "Gas World" for June 1, 1901, where an article appears bearing on this matter, and on the authority of Herr Menzell, of Berlin, it is stated that 2 per cent. of air enables a cubic foot of material to deal with at least 12,000 to 15,000 cubic feet of gas before being renewed; and that of the 2 per cent. of air, 1½ per cent. remains in the gas without any harm to the lighting power. Herr Wahl, of Güstrow, had been using 3 per cent. of air without heating and with no loss of light, provided the gas was hot when the air came into it. It seems, therefore, more a question of the point of admission than a question of air. One thing is certain, in my experience—that the process of emptying the boxes is accompanied by a less noxious smell pervading the place than when no air is used.

In closing, I might venture to say that the quantity of gas

passed per box during December is very far from agreeing with the customary calculation generally taken into account when planning new plant; and the difficulty of arriving at the best paying size in a manufacturing town is worthy of some further consideration.

INCANDESCENT GAS LIGHTING FOR PICTURE GALLERIES.

Some months ago, the Museum and School of Art Committee of the Birmingham Corporation were exercised over the subject of the lighting of the Museum and Art Gallery; and the Electricity and Gas Committees were asked to fix temporarily the best forms of burners they could suggest. The result was that the Gas Committee, with Kern burners in ventilating shafts, proved to demonstration the superiority of this system of lighting. As the brilliancy of the illumination was undeniable, the advocates of electricity raised the objection that the use of gas was detrimental to pictures; and in support of it the statement was made that the owners of valuable paintings would not lend them for exhibition in gas-lighted galleries. In these circumstances, it was suggested that the subject should be thoroughly investigated. Thereupon Dr. Percy F. Frankland, F.R.S., Professor of Chemistry and Metallurgy in the University of the city, offered to conduct a series of experiments with the view of settling any doubts existing on this matter. His report was duly presented to the Committee, who, at their meeting on Monday last week, authorized its issue to the Press. We have received a copy; and, in view of the status of the author, and the importance to the gas industry of the conclusions at which he has arrived, we reproduce the document in its entirety.

I have to report to you on the experiments which I have made in the large room of the Art Gallery, with a view to ascertaining whether its artificial illumination by electric arc lamps or by the incandescent gas installation respectively is preferable from the point of view of possible damage to pictures exhibited there.

The danger to be apprehended in the case of gas lighting is from the corrosive products of combustion of the sulphur compounds, which are always present in more or less quantity in coal gas. It may consequently be taken for granted that safe illumination by gas can only be effected if due precautions are taken for removing these products as fast as they are formed, and without permitting them to circulate through the air of the room. The principal point to be ascertained, therefore, was whether the shafts passing straight through the roof of the gallery, and opening below with a large funnel-shaped aperture immediately over the incandescent gas-burners, were adapted to immediately remove the products of combustion, and so prevent their circulation through the gallery. The investigation thus resolved itself into determining whether the products of combustion can be detected in the air of the gallery, and, if so, to what extent they are present. This point could be most expeditiously ascertained by determinations of the proportion of carbonic acid in the gallery under varying conditions of illumination.

First Series of Experiments.

In the first instance, I made a series of experiments in which the percentage of carbonic acid was determined in the air of the gallery the first thing in the morning, and then again after one of the two artificial illuminants had been in use for a definite number of hours. On one day no illuminant was employed, in order to ascertain to what extent the carbonic acid in the air varied during the day irrespectively of illumination.

The air of the gallery at three different levels was in each case examined—at the floor level, at a height of 31 feet, and at 14 ft. 6 in. above the floor level respectively. The results obtained are recorded in Table I.

TABLE I.

Friday, Feb. 28, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. Electric Light from 12.5 p.m.
Top level	11.50 a.m. 0·081 volume.	2.55 p.m. 0·057 volume.
Middle level	12 noon 0·066 ,,	3.0 ,, 0·059 ,,
Floor	11.40 a.m. 0·031 ,,	2.50 ,, 0·077 ,,
	Mean 0·059 ,,	Mean 0·064 ,,

Monday, March 3, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. Incandescent Gas from 12.25 p.m.
Top level	12 noon 0·066 volume.	3.10 p.m. 0·067 volume.
Middle level	12.15 p.m. 0·061 ,,	3.27 ,, 0·067 ,,
Floor	12.10 ,, 0·060 ,,	3.15 ,, 0·095 ,,
	Mean 0·062 ,,	Mean 0·076 ,,

Tuesday, March 4, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. No Artificial Illumination.
Top level	10.45 a.m. 0·061 volume.	2.13 p.m. 0·065 volume.
Middle level	10.45 ,, 0·050 ,,	2.25 ,, 0·072 ,,
Floor	10.45 ,, 0·094 ,,	2.13 ,, 0·089 ,,
	Mean 0·068 ,,	Mean 0·075 ,,

Wednesday, March 5, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. Electric Light from 10.25 a.m
Top level	9.50 a.m. 0·061 volume.	2.25 p.m. 0·075 volume.
Middle level	9.50 ,, 0·084 ,,	2.37 ,, 0·096 ,,
Floor	9.50 ,, 0·076 ,,	2.25 ,, 0·077 ,,
	Mean 0·074 ,,	Mean 0·083 ,,

Remarks.—The gas had been lit throughout the building at 6 a.m., but was turned out at 11.15 a.m.

From this tabular statement, it will be seen that the results of these experiments are somewhat inconclusive. Thus, taking the two days on which the electric light was employed, on the first there was the smallest, and on the second the largest, mean proportion of carbonic acid throughout the series. In fact, during the course of these experiments, it became evident to me that there were other factors which must be taken into consideration. There were notably the number of visitors in the galleries, and also the use of gas in parts of the building other than the large room in which the experiments were being conducted.

It is obvious that as the air escapes through the shafts at the top of the large room, air will be drawn in from the other galleries through the large open doorways leading into the room, and the composition of the air in the latter will thus be influenced by the nature of the air in the remainder of the building. Owing to the necessity of lighting the building in the early morning for cleaning, and owing to the frequent occurrence of temporary darkness, more or less prolonged, during the day, the gas had often to be lit in other parts of the building during the course of my experiments, thus leading to much irregularity in the nature of the conditions. I determined, therefore, to make a further series of experiments when the days had become longer and brighter, and when, therefore, these causes of irregularity could be avoided.

It appears, however, from this first series of experiments, that the carbonic acid of the air in the large room is practically the same, irrespectively of whether electric light, gas, or no illumination is employed. It is evident, therefore, that the removal of the products of combustion from the gas-burners must be very efficient, as otherwise greatly increased proportions of carbonic acid would have been observed after the illumination by gas.

Thus the following experiments made in my ill-ventilated lecture-theatre and laboratory at the University will serve to illustrate the rapid accumulation of carbonic acid in the air of rooms in which gas is being used. I have also appended, in Table II., for purposes of comparison, the results of experiments made on the roof of the University, from which the relative amount of ventilation in the rooms can be judged.

TABLE II.

Private Chemical Laboratory, University, Jan. 16, 1902.

2.30 p.m., percentage of carbonic acid=0·111 volume.

Chemical Lecture Theatre, University, Feb. 5, 1902.

2 p.m., theatre unusued for several hours, and no gas burning.
Percentage of carbonic acid = 0·086 volume.
3.46 p.m., after gas (seven bunsens and eight incandescent burners) had been burning since 2 p.m. in the empty theatre.
Percentage of carbonic acid = 0·184 volume.

Chemical Lecture Theatre, Feb. 6, 1902.

Tests made immediately after a lecture in which gas was used.
Floor of theatre, 10.40 a.m., p. ct. of carbonic acid = 0·169 volume.
Top of theatre, 10.50 a.m. ,, ,, ,, = 0·175 ,,

Roof of University Building.

Feb. 5.—11.25 a.m. .. Percentage of carbonic acid = 0·053 volume.
Feb. 6.— 2.15 p.m. .. ,, ,, ,, = 0·041 ,,
2.25 ,, .. ,, ,, ,, = 0·041 ,,
April 28.—10.2 a.m. .. ,, ,, ,, = 0·046 ,,
10.12 ,, .. ,, ,, ,, = 0·043 ,,
10.25 ,, .. ,, ,, ,, = 0·048 ,,
3.15 p.m. .. ,, ,, ,, = 0·047 ,,
3.18 ,, .. ,, ,, ,, = 0·047 ,,
3.21 ,, .. ,, ,, ,, = 0·043 ,,

On comparing the figures recorded in Tables I. and II. respectively, it will be seen that the percentage of carbonic acid in the air of the Art Gallery is very much smaller than that present in the air of a room illuminated by gas. It follows, therefore, that the carbonic acid formed in the combustion of the

great quantity of gas used for illuminating the large room of the Art Gallery is most effectually removed by the ventilating shafts provided.

Second Series of Experiments.

The second series of experiments, in which the disturbing factors referred to above were as far as possible avoided, was carried out on six days, between the 16th and 23rd of April. On each of these days the amount of carbonic acid in the air of the large gallery was determined in the morning, before any artificial light had been used at all. The gallery was then on each of two days continuously illuminated, for a period of about four hours, with the arc lamps; the carbonic acid in the air being again determined at the end of this time on each day. On each of two other days the gallery was for the same period of time illuminated with the incandescent gas-burners, and the carbonic acid similarly determined before and after this illumination. Again, on each of two other days, no artificial light whatever was employed in the gallery, and the carbonic acid was determined as before in order to ascertain whether, and, if so, to what extent, its proportion had changed during the given interval of time when the gallery was not subject to the influence of artificial illumination. The air was in each case, as in the first series of experiments, abstracted for analysis at three different levels; and the results obtained are recorded in Table III.

TABLE III.

Wednesday, April 16, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. Electric Light from 10.40 a.m.
Top level . . .	10.15 a.m. 0·056 volume.	2.58 p.m. 0·050 volume.
Middle level . .	10.27 ,, 0·046 ,,	3.10 ,, 0·049 ,,
Floor	10.10 ,, 0·044 ,,	2.57 ,, 0·056 ,,
	Mean 0·049 ,,	Mean 0·052 ,,

Remarks.—Visitors between 10 a.m. and 6 p.m., 835.

Thursday, April 17, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. Incandescent Gas from 10.45 a.m.
Top level . . .	10.5 a.m. 0·051 volume.	3.5 p.m. 0·051 volume.
Middle level . .	10.17 ,, 0·062 ,,	3.17 ,, 0·051 ,,
Floor	10.5 ,, 0·049 ,,	3.5 ,, 0·041 ,,
	Mean 0·054 ,,	Mean 0·048 ,,

Remarks.—Visitors between 10 a.m. and 3.30 p.m., 1348.

Friday, April 18, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. No Artificial Illumination.
Top level . . .	10.5 a.m. 0·045 volume.	3.2 p.m. 0·053 volume.
Middle level . .	10.17 ,, 0·045 ,,	3.17 ,, 0·049 ,,
Floor	10.5 ,, 0·053 ,,	3.2 ,, 0·046 ,,
	Mean 0·048 ,,	Mean 0·049 ,,

Remarks.—Visitors between 10 a m. and 3.15 p.m., 519.

Monday, April 21, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. Electric Light from 10.40 a.m.
Top level . . .	10.7 a.m. 0·045 volume.	3.15 p.m. 0·060 volume.
Middle level . .	10.29 ,, 0·036 ,,	3.2 ,, 0·050 ,,
Floor	10.7 ,, 0·032 ,,	3.2 ,, 0·049 ,,
	Mean 0·038 ,,	Mean 0·053 ,,

Remarks.—During the experiment the gas had to be lit in the long gallery adjoining for about five minutes. Visitors between 10 a.m. and 3 p.m., 800. The windows in the long gallery adjoining were half open all day.

Tuesday, April 22, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. Incandescent Gas from 10.40 a.m.
Top level . . .	10.5 a.m. 0·048 volume.	3.0 p.m. 0·062 volume.
Middle level . .	10.17 ,, 0·050 ,,	3.12 ,, 0·047 ,,
Floor	10.5 ,, 0·063 ,,	3.0 ,, 0·049 ,,
	Mean 0·054 ,,	Mean 0·053 ,,

Remarks.—One window in the long gallery adjoining was half open throughout the day. Visitors between 10 a.m. and 3 p.m., 423.

Wednesday, April 23, 1902.

—	Percentage of Carbonic Acid.	Percentage of Carbonic Acid. No Artificial Illumination.
Top level . . .	10.5 a.m. 0·045 volume.	3.5 p.m. 0·049 volume.
Middle level . .	10.17 ,, 0·056 ,,	3.17 ,, 0·061 ,,
Floor	10.5 ,, 0·046 ,,	3.5 ,, 0·050 ,,
	Mean 0·049 ,,	Mean 0·053 ,,

Remarks.—The windows in the long gallery adjoining were half open all day. Visitors between 10 a.m. and 3 p.m., 727.

From these, it will be seen that on each of the two occasions on which no artificial illumination was employed, there was a very slight increase in the percentage of carbonic acid in the air; the increase being more marked on the day on which there was the larger number of visitors to the galleries.

On both occasions on which the gallery was illuminated with electric arc lamps, there was an increase in the proportion of carbonic acid in the air. The greater increase was on the day on which the smaller number of visitors was recorded. But this statement requires qualification, for the larger number of visitors given for April 16 was the turnstile record for the *whole* day, between 10 a.m. and 6 p.m.; while the number given for April 21 was that recorded by the turnstiles between 10 a.m. and 3 p.m. It is, therefore, highly probable that there were really more visitors on this day during the hours of the experiment.

Finally, on both occasions on which the incandescent gas was used, there was a diminution in the percentage of carbonic acid in the air; this diminution on the first occasion taking place notwithstanding the contributions of carbonic acid to the air by an exceptionally large number of visitors who attended the gallery on the market day.

These experiments clearly show that, under the conditions of ventilation prevailing at the time—

(*a*) In the absence of any artificial illumination, there is a slight increase in the percentage of carbonic acid in the air of the gallery during the course of the day.

(*b*) With the arc lamp illumination, the increase in the percentage of carbonic acid is distinctly more marked.

(*c*) With the incandescent gas illumination, on the other hand, instead of there being any increase, there is a distinct diminution of carbonic acid in the air.

The explanation of this diminution is not far to seek, it being obviously due to the more efficient ventilation of the gallery, which is caused by the great draught of heated air through the shafts which are placed above the incandescent burners.

The circumstance that the percentage of carbonic acid actually diminishes during the use of the incandescent gas-burners conclusively proves that the products of combustion from which damage to the pictures might be apprehended are completely carried off by the ventilation, which is so much promoted by these burners.

In my opinion, therefore, the incandescent gas installation at present provided in the Art Gallery is to be preferred to the arc lamps, which are much less effective in promoting ventilation; and although these lamps do not give rise to sulphur compounds, they do generate ozone and oxides of nitrogen, which are calculated to act prejudicially on pictures. In order that this advantage may accrue from the use of the incandescent gas illumination, it is, of course, necessary that the air, which is drawn into the room by the increased draught which the gas generates, should not have been exposed to unventilated or insufficiently ventilated gas-flames, otherwise the products of combustion of the latter will be circulated through the gallery.

The Begging System.—With reference to this unpleasant subject, to which considerable attention has lately been given in our columns, we regret to say that we have had brought to our notice another letter (this time from the Secretary and Treasurer of a Gas Company in the North), which is to the following effect: "As our respected Manager is about to take to himself a wife, it has occurred to me you might be desirous of manifesting your regard for him in a tangible form; and, if so, I shall be glad to have your mite added to my subscription sheet." In a postscript, the writer thoughtfully adds: "Should you prefer sending a present direct, you are at liberty to do so." The letter, it should be mentioned, was addressed to a firm of gas appliance manufacturers.

The Lacarriere Incandescent Burner.—This burner, which is constructed on the Houdaille and Triquet system, was brought under the notice of the members of the Société Technique at their last meeting, by M. Badon-Pascal. Its special features are that it allows as close a mixture of air and gas as is possible, while the mantle is acted upon by a current of air which considerably increases its illuminating power. Experiments carried out in the Municipal Laboratory in Paris show that, with a consumption of 5 cubic feet of gas, at a pressure of 22-10ths, a light of 142 candles is obtainable; 3 cubic feet giving 94 candles. Similar trials made at Lyons showed that $3\frac{1}{2}$ cubic feet burnt at a pressure of 15-10ths produced a light equal to 75 candles. The burner is made in four sizes, for consumptions ranging from 2 to $5\frac{1}{2}$ cubic feet.

BRITISH ASSOCIATION OF WATER-WORKS ENGINEERS.

The Seventh Annual General Meeting of the Association was held last week at Leicester, under the presidency of Mr. FREDERICK GRIFFITH, M.Inst.C.E., the Corporation Water Engineer. There was perhaps rather more than an average attendance of members, who found provided for them a week full of interest. The only thing which militated against the entire enjoyment of the visit was the fitful character of the weather.

The proceedings were opened in the Council Chamber of the Town Hall on Tuesday morning. The President received the members in the ante-room; and, almost immediately afterwards, they were welcomed by the Mayor (Alderman Edward Ward, J.P.), who is also Chairman of the Water Committee.

His WORSHIP, in his introductory words, heartily welcomed the visitors; and, proceeding, he said that he thought Leicester stood out prominently in their municipal enterprise. They had accomplished a great deal in the town that had resulted in improved health to the inhabitants, and perhaps from no better source had they reaped that result than from the excellent water supply they had been favoured with for many years past. He also expressed the hope that the conference of the members would be a successful one; that it would result in uniting them more closely; and that it would tend to add to that large store of knowledge which every water-works engineer possessed. The country owed much to water engineers, who had shown how water could be developed, and how it could be economized and distributed. As a profession, water engineering held a very high position among the other professions of the world.

FORMAL BUSINESS.

Mr. C. H. PRIESTLEY (Cardiff), a Past-President, took the chair at the opening of the proceedings.

The SECRETARY (Mr. Percy Griffith, of London) having read the minutes of the autumn meeting, they were confirmed.

Mr. G. Greenslade (South Hants Water Company) and Mr. J. W. M. Richardson (Birkenhead) were appointed Scrutineers of the balloting-lists.

THE NEW PRESIDENT.

The CHAIRMAN said the circumstance under which he took the chair was a matter for deep regret. But the only other duty which fell to him was to introduce the President-Elect, Mr. Frederick Griffith. He congratulated Mr. Griffith upon the large number of members present and upon the splendid representation he had at the Council meeting the night before.

Mr. GRIFFITH, on taking the chair, was received with loud acclamation.

THE LATE PRESIDENT.

The PRESIDENT said the first duty he had to perform was a melancholy one. It was to propose a vote of condolence with the widow and family of their late President. Mr. Richardson, twelve months ago, entered upon the presidency of the Association; but unfortunately he was taken ill, and died in the middle of his presidential year.

Mr. C. E. JONES (Leyton) said it was with sorrowful feelings that he rose to second the motion. They all regretted very much the loss the family of Mr. Richardson had sustained by their bereavement, and the loss the Association had also sustained by the removal of a very valuable member. Mr. Richardson combined much amiability with high consciousness of duty assiduously performed. He did good professional work; and he had gone to seek that rest and that peace which "passeth all understanding." Mr. Richardson was the first President they had lost; and he (Mr. Jones) hoped it would be a long time before any of their respected Presidents followed over to the majority. The family of Mr. Richardson they must leave to a higher power for that consolation which could only come from above. But the duty of the members was plain, and it was with a considerable feeling of distress that he seconded the motion.

The proposition was carried by the members silently rising in their places.

The PRESIDENT then read his

INAUGURAL ADDRESS.

In the first words of his address, the President thanked the members for the honour they had done him in electing him to the highest position they could confer. Then a hearty welcome was followed by a brief *résumé* of the operations and general progress of the Association during the past year. In this connection, he referred to the increase in the membership—pointing to the facts that the total number of members in 1900 was 223, in 1901 230, and this year 262. He held that in securing this large accession of new subscribers, the Council had carefully and successfully maintained, if not advanced, the status of the Association as defined in the rules; and he urged upon the members the desirability of maintaining this rate of increase by taking every opportunity of introducing friends who might be eligible. The ballotting list that day, he incidentally remarked, contained 27 new names. The meetings held last year were reviewed; and here the President had the opportunity of mentioning in connection with the manufacture of cast-iron pipes, that the Council have appointed a Committee to deal with the question of standardizing dimensions and weights of such pipes. It is proposed to take the matter up definitely, and with as little delay as may be; and the members will have further opportunities of assisting in this very valuable reform at an early date.

Dealing with the question of water-works returns, he said it would be remembered that, on the recommendation of the Water Boards Committee, the Council, and subsequently the general meeting of Dec. 8, 1900, decided to undertake the collection and tabulation of returns relating to the engineering features of all water-works in the country. After most careful consideration, a form of return has been prepared by the Committee and approved by the Council; and it will very shortly be issued to all water engineers and others likely to be able to afford the required information. The difficulty involved by the expense connected with the collection, tabulation, and printing of the information has been successfully, and the President thinks satisfactorily, overcome by an arrangement entered into with Messrs. Hazell, Watson, and Viney, Limited, under which they undertake to relieve the Association entirely of the expense and labour involved in this undertaking on the strength of the probable profits arising from the sale of the volume, while allowing the Association full credit for the influence which their co-operation will exert upon both the collection and the sale of the returns.

Leaving the subjects arising out of the past proceedings, the President said: The motto of the engineering profession is "the cultivation of the art of directing the great sources of power in Nature for the use and convenience of man;" and it must be admitted that engineers of the last century, as well as those of to-day, have been fully alive to that charge, and by strenuous labour have produced results which have contributed in no small degree to the health and well-being of the whole community. In no small measure have the health and comfort of the community been increased by the hydraulic engineer, who, though more or less closely associated with mankind throughout all ages, has vastly increased his influence during the last half-century, by a more scientific study of rainfall and other natural phenomena bearing upon his particular work, by a more systematic gauging of rivers and streams, by the construction of vast storage reservoirs to protect our large cities from the effects of occasional drought, by closer study of the processes of filtration and purification of water, and by many other developments having for their object the more perfect distribution of an abundant supply of pure water at a minimum of cost to the consumer. Truly, water consumers ought to be grateful to the past generation of water engineers for their skill and forethought in initiating and providing for the development of so many improvements of which the present generation enjoy the fullest benefit.

With improved sanitary conditions, including pure air and pure water, the number of water consumers has increased even more than proportionately to the advance of the trade of the country, with the result that in many cases sources of supply which seemed inexhaustible a generation ago have gradually failed to meet increasing demands; and the consideration of additional supplies has been forced on the various water authorities from time to time. In this way, large centres of population have been to an increasing extent compelled to go great distances to secure sufficiently abundant sources of pure water. Glasgow was one of the first to take the lead in this direction, by going to Loch Katrine for its supply; and in course of time Liverpool, Manchester, and Birmingham have followed suit. London, however, still awaits the provision of a water supply from a similar pure and abundant source.

The population of Leicester fifty years ago was 60,642 persons; and the only available water supply at that time was derived from a source called the "old conduit," situated near to the north-east of the town, where springs were found to exist. The water was gathered and stored and gravitated through pipes to the Market Place, where it was distributed. There was also a supply from deep and shallow wells in various parts of the town. The quality of the water was bad—being hard and often polluted from various causes, and was insufficient in quantity. A Company was formed for the better water supply of the town; and an Act of Parliament was obtained for the first water-works at Thornton in 1847. The water is here collected from the drainage area of 2840 acres. It was first supplied to the town in 1854. From this source the water flows by gravitation to a service reservoir at New Parks, and thence to distribution. The supply of this water was so much appreciated that the Company were soon compelled to look out for a further source of supply; and a Bill authorizing the construction of the Bradgate reservoir was obtained in 1866. The works were opened in 1870. At this station, the water (collected from the drainage area of 4400 acres) is stored, filtered, and pumped to service reservoirs, whence it gravitates to distribution.

The Company's undertaking was acquired by the Corporation in 1878, when the water population was 100,172 persons, and the consumption was 27 gallons per head per day for all purposes. In 1880, the still increasing demand for water compelled the Corporation to find further sources of supply, and eventually (in 1890)

the Swithland reservoir scheme was sanctioned by Parliament. The water is here obtained from the drainage area of 3500 acres. After filtration, it is pumped to a service reservoir at Hall Gates, and thence gravitates to distribution. The works were completed and opened in September, 1896, by Mrs. Wood, the present Mayoress of Leicester, who was also Mayoress in that year. This brief description of the water supply of Leicester would be incomplete without some reference to the important scheme now in progress for securing to Leicester a share of the water in the Upper Derwent watershed. In 1898, the Water Committee consulted Mr. J. B. Everard, M.Inst.C.E., and ultimately decided to promote a Bill to acquire a supply of water from the Derwent and Ashop streams in Derbyshire. This scheme is the most important, without exception, of any promoted and authorized in modern times. Its most striking and unique feature is the fact that it provides for the supply of three other important trade centres—Sheffield, Derby, and Nottingham—as well as Leicester. Owing to the magnitude of the works required, this new source of supply will not be available until 1910.

Already the water population of Leicester has reached 250,000 persons; the consumption for all purposes averaging 19·25 gallons per head per day, of which about one-third is supplied by meter for trade purposes, and the remainder used for domestic supply. It will be observed that, during the period of municipal control, the water population has increased by 150 per cent.; while the consumption per head per day has been reduced by 30 per cent. In other words, while the total average yield of the present works is under 5 million gallons per day, the prevention of waste enables a constant supply to be given. If the consumption per head was the same now as at the time the Company's undertaking was acquired, the quantity of water necessary to give a constant supply would be 7 million gallons a day. Thus, the result of the system of distribution and waste prevention adopted in Leicester under municipal control is a saving of 2 million gallons per day.

It cannot be denied that many of the great cities and centres of population have been obliged to seek new sources of supply much sooner than would have been the case had reasonable precautions been adopted to reduce the amount of preventable waste, which in so many cases is permitted to go on unchecked. It is well known that some authorities are using as much as 45 to 50 gallons per head per day, and are consequently surprised and alarmed, when, during a summer drought, the sources of supply threaten exhaustion; the simple and obvious reason in most cases being that the consumers are permitted to waste their resources by the use of bad or inferior fittings, and excessive underground waste from burst pipes and services is also neglected, both of which can be easily detected by a proper system of waste inspection. The fact that it is possible to control the consumption of water within moderate limits is now well established; and it is a reflection of a grave character upon water authorities, as well as water-works engineers, that, in permitting the use of bad services and fittings, and generally neglecting preventable waste, they involve their undertakings in the supply of large volumes of water which otherwise would be totally unnecessary.

Except in districts peculiarly well situated as regards water supply, a constant service at high pressure cannot be maintained unless the mains, services, and fittings are of the best possible quality; hence the necessity of regulations being drawn up for preventing the waste and misuse of water. These should prescribe the standard of all fittings, and contain instructions to plumbers, which, if insisted on, will result in materially improving the quality of water-fittings generally. The use of good fittings, combined with regular inspection, and the free supply of bib-tap washers, must inevitably secure a considerable reduction in the consumption of water. In my own town, this result has been secured without the use of any waste-water meters.

I have recently had an opportunity of studying regulations regarding the water supply sent me by a large number of water authorities; and I am obliged to state that there is a general want of uniformity running through these regulations. I am, therefore, led to suggest that this Association would confer a lasting service on all water authorities if they would take the matter into consideration and draw up a set of standard regulations for the prevention of waste and misuse of water. Such model regulations should then be submitted to the Local Government Board for confirmation, and application be made to Parliament for a short General Act conferring the necessary powers of compulsion upon any water authority who desired to avail themselves of them. The evils arising from neglect of this important feature of water-works management may be summed up as follows: Waste causes needless and excessive draught on the sources of supply, which often produces a water famine in the summer time, owing to the exhaustion of the available supply. It also involves unnecessary strain on pumping plant, and extra cost in repairs, fuel, and wages. In works where the whole supply is filtered, waste means an excessive strain on the filter-beds; and, in large cities, the additional burden of again dealing with the surplus water as sewage. All these difficulties may be reduced or done away with by securing proper economy in the distribution of water.

The purification of water drawn from storage reservoirs is a subject which requires the careful consideration of the water engineer. The method usually adopted is filtration through sand; and this, as a rule, answers the purpose perfectly well, except when the growth of vegetation or *algæ* alters the character of the water, and causes it to give off offensive smells, when it is only to be expected that consumers should become alarmed, and complain bitterly of the quality of the water supplied. Such complaints can generally be traced to the defective purification of the water, and, in fact, where a quantity of from 8 to 10 million gallons have to be dealt with daily, the filters sometimes become so loaded with vegetable *algæ* that they become choked up and refuse to pass any water at all. To deal effectually with such difficulties, the study of the biology of water is essential, and reference should be made to standard text-books dealing with the question. After many years' experience of the subject, I am led to the conclusion that, in order to obtain the best results from filters, they should be kept perfectly clean, and the sand washed through to the shot once every three years—the surface washing taking place every fourteen days. The filtration area, too, should be sufficiently large to allow the rate of filtration never to exceed 300 gallons per square yard per 24 hours.

I cannot help referring here to the valuable paper presented to the Association by Dr. Kemna in 1899, dealing with "The Biology of Sand Filtration." Moreover, the process of purification in operation at the Antwerp Water-Works is so interesting, and is carried out so successfully by Dr. Kemna under very difficult conditions, that a visit to these works would amply repay those water engineers who desire to further investigate the question of the purification of water in bulk; and it is possible that such a visit may be arranged for in the near future—Dr. Kemna having offered the Association a cordial welcome, and every possible information and assistance.

In carrying out the various complicated duties connected with the office of engineer and manager of a water undertaking, the best results can only be obtained by cultivating a feeling of confidence and respect throughout the staff. The engineer is obliged to place confidence in his foreman, the foreman in the inspector, and so on, as links in a chain. The cultivation of courtesy towards and among the whole staff is also desirable, not only in the interests of the officials themselves, but in those of the public whom we have to serve. Absolute cleanliness in engine-houses, workshops, filters, grounds, works, and offices, is also of vital importance, as not only does it conduce to healthy surroundings, but the visitor is satisfied that, so far as health and cleanliness are concerned, the first necessary of life—*pure water*—has received every possible attention from those responsible for its supply and distribution.

At the close of the address,

Mr. PRIESTLEY said it was with great pleasure that he proposed a vote of thanks to the President. The manner in which he had touched upon various problems and traced the progress of the Leicester water supply would form interesting features in their transactions.

Mr. W. MATTHEWS (Southampton) seconded the motion; and it was unanimously agreed to.

ELECTION OF AUDITORS AND MEMBERS.

At this point, Mr. J. White Lewis (Farnham) and Mr. J. R. Downes (Redhill) were appointed Auditors for the current year.

The Scrutineers also reported that the whole of the nominated members and associates had been elected. The names are as follows:—

Members—Mr. F. L. Ball, of Maidstone; Mr. W. D. Harding, of Exmouth; Mr. G. Hodson, of Loughborough; Mr. F. W. Hodson, of Loughborough; Mr. T. Kidd, of Swadlincote; Mr. C. G. Mason, of Guildford; Mr. R. M'Mdoe, of Valparaiso; Mr. J. C. Mellis, of Westminster; Mr. J. W. Moore, of Tottenham; Mr. J. C. Mount, of Lancaster; Mr. F. Parr, of Bridgwater; Mr. S. Reid, of Penang, S.S.; Mr. R. B. Rigby, of Bury (Lancs.); Mr. C. C. Smith, of Wakefield; Mr. F. Tomlinson, of Northampton; Mr. E. B. Taylor, of Westminster.

Associates—Mr. E. M. Bate, of Islington; Mr. T. E. Bower, of London; Mr. F. Gandy, of Chesterfield; Mr. F. A. Goodman, of Cape Town; Mr. A. E. King, of Loughborough; Mr. F. W. Lillicrap, of Plymouth; Mr. A. H. Nathanielsz, of Glasgow; Mr. H. Smith, of Guildford; Mr. W. Wallin, of Newcastle; Mr. F. M. Watson, of Rotherham; and Mr. E. H. Whiteford, of Derwent Valley.

PAPERS READ.

The quantity of business transacted at the meeting precludes the publication this week of any part of the papers read; but abstracts of the communications and the main features of the discussions will be given in subsequent issues. The consideration of the papers was spread over the sittings on Tuesday and Wednesday, and Thursday mornings, and they were taken in the following order: "The Standardization of Water-Fittings," by Mr. R. S. LLOYD, M.Inst.C.E. (of Messrs. Hayward-Tyler and Co.); "The Application of Suspended Steam-Pumps to the Sinking of Deep Shafts," by Mr. W. PRICE ABELL, M.Inst.C.E.; "Rural Water Supplies," by Mr. H. G. KEYWOOD, and Mr. J. DEWHURST; "The Electrolysis of Cast-Iron Mains," by Mr. W. H. HUMPHREYS; "Turbine Pumping Plant at Windsor," by Mr. C. SAINTY, M.Inst.C.E.; "Turbine Pumping Plant at Guildford," by Mr. C. G. MASON; and "Water-Power Pumping Plant at Reading," by Mr. A. T. WALKER.

Centralizing the Control of Water Supply and Drainage Areas.

Invited by the President,

Mr. E. G. Malbey, the Borough Surveyor of Leicester, and Past-President of the Association of Municipal and County Engineers, brought to the notice of the members, at the request of the Sanitary Institute, a letter received from Mr. R. E. Middleton, M.Inst.C.E., in which he (influenced by a speech of the Duke of Northumberland) asked the Institute to direct the attention of his Grace to the desirability of there being one great central authority not only for water supply, but for the purposes of drainage; that this authority should work through local authorities having charge of the drainage areas of the main rivers of the country; and that each local authority should be entrusted with the care of the supply of water of each district, and the arrangement of the sewering work. At the present time, Mr. Middleton's letter pointed out, there were numerous authorities all having conflicting interests in a drainage area; and it appeared to him that this state of things was injurious to the country. He considered this should be altered by having special authorities in charge of the water supply of districts. In Mr. Malbey's supplemental remarks, he said that he thought it would be a very delicate thing indeed to try to supersede the Local Government Board by the institution of any special authorities; but perhaps Mr. Middleton was only suggesting that such authorities should work in conjunction with the Local Government Board—probably as off-shoots. It appeared to him that water legislation was an extremely difficult problem—particularly with regard to rural supplies. There was no doubt, however, that improved legislation was necessary even in regard to the water supply of great towns as well as rural districts. They had an example in the Derwent water scheme, in which Leicester had joined.

Mr. Middleton, called upon by the President, said he had no idea his letter to the Sanitary Institute would be submitted at this meeting. However, the matter was one which, in his opinion, was of the first importance in the interests of the country; but its ramifications were so many that it would be impossible to deal with them at the present time. He had not thought of the supersession of the Local Government Board at all, but simply the altering of the supervision of the country into drainage areas—let them say for water-works and sewage purposes. The authorities should be primarily for the drainage area in which the water supply and the drainage existed. They had already a certain number of authorities for drainage areas. But it was a misfortune that these authorities had not the same powers—they did not rule absolutely similar areas; and their ability to deal with the question of sewage was in most cases, to say the least, a bit doubtful. What he suggested was therefore that the country should be divided up into drainage areas; that there should be (he might term it) a Conservancy Board for each of these areas; and an Act should be passed giving to each of these Conservancy Boards certain power and authority—of course, in conjunction with, or under the supervision of, the Local Government Board. Having divided up the country in this way, and instituted these authorities, each might very easily be made up from bodies already existing—from the county councils, and from the borough and district councils. These bodies should then have in their power the consideration of all schemes for the water supply and drainage within their several areas—not that they should institute schemes, but all promoted schemes should pass through their hands. They should have the power of drawing attention to the defects in those schemes, and to say whether or not, in their opinion, such schemes ought to be further considered. They should also have the power to call upon different areas to combine together both for water-works and drainage purposes, so as to reduce the cost and complexity of divisions to which had been traced so many of the difficulties of the past. He hoped to have the opportunity of putting his thoughts before the members in a more complete manner on a future occasion.

Mr. W. J. Freer, Clerk to the Leicestershire County Council, and a member of the Special Committee appointed by the County Councils Association to consider this question, gave a *résumé* of what the latter Association had done in this matter. Some time since, the Committee drafted a short Bill (for the purpose of focussing discussion), providing for the formation of Water Boards for various areas, with the consent of the Local Government Board, and giving authority to deal with the water supply and sewage disposal in those areas. The whole Association had further considered the matter only a few months since; and it was then decided to present a memorial to the Government pointing out the importance of the question, and asking for the appointment of a Parliamentary or Departmental Committee to take evidence, and go into the whole question. The County Councils Association, representing as it did every county in England and many in Wales, had felt that the matter was of the greatest importance; and they were anxious that some scheme should be devised by which all authorities should be brought together to further it.

The Secretary said he should like to point out that their own Association had taken great interest in this subject; and he thought it desirable that their share in it should be made known. In the first place, a Committee was appointed considerably more than two years ago. The next step was the discussion of the whole subject by a Committee; and the result was a report was submitted to the general winter meeting in 1900, when the Sanitary Institute, the County Councils Association, and several other kindred bodies, sent delegates, who contributed some valuable material to the discussion of the subject. This discussion had been made use of by the Committee, who had endeavoured to assimilate, and to carry out what appeared to them to be the general concensus of opinion of the profession as regards future procedure. The Association were alive to the points that had been made by the speakers on this occasion; but he thought he was representing the opinions of their own Committee when he said that they were proceeding on the principle of being slow and sure. There were so many delicate points involved in the whole question that they felt it was a case for caution, in order that the result might be satisfactory, if possible, to all parties. There were so many large interests involved in this question that the Committee felt it was of the utmost importance to approach the subject both slowly and gradually, in order that all the interests might be considered, and, if possible, reconciled. The last stage of the proceedings had been that they had decided, and were now collecting as much information as possible on the engineering details of the water-works of the country, and arranging them for publication, with the special view of contributing to the helping forward of this subject. The Association had also been approached by the County Councils Association to join with them in a deputation to the Local Government Board, or in making a representation to His Majesty's Government. This was discussed by the Council the previous night; and they had decided to accede to the request. He understood the Sanitary Institute were also going to join in the deputation; so that it would obviously become a representative one. He ought to have previously mentioned that the resolutions passed by the Association when they discussed the subject in open meeting were sent to the Local Government Board, to the Board of Trade, and to several other Government representatives, so that the Association's interest in the matter had been before the authorities for many months past.

Mr. Middleton remarked that he began to press the consideration of this matter on the attention of different Societies more than ten years ago; and five years since he read a paper on it before the Sanitary Institute.

No resolution was submitted; but this digest of the discussion shows the active interest that is being taken in the question.

Before the consideration of papers was proceeded with on Wednesday morning, Dr. Joseph Priestley, the Medical Officer of Health for the Borough of Lambeth, delivered a lecture (of which the following is a condensed account) on the subject of

Domestic Filtration.

We are all agreed (said the lecturer) that pure water is an absolute necessity. We are further agreed that the purity of a water is to be gauged chiefly, if not entirely, by the absence therefrom of pathogenic germs—*i.e.*, germs that may cause disease in those persons, or animals, into whose bodies they may gain an entrance through the medium of drinking water, or in other ways. Nature has given us pure water; man in the past has done his utmost to contaminate it, and is still doing so in the present. Persons supplied from a particular water area are subject to dangers from different sources before the water is brought within their reach—dangers affecting one and all, and dangers which can only be successfully combatted by water engineers. Can anything further be done by engineers, or by the consumers themselves, to afford more protection? The lecturer thinks it can, in the way of still further purifying the water on the premises on which it is going to be drunk. Sterilization by boiling, or by chemical means, is found to be, from a practical point of view, out of the question; and we are face to face with the only remaining available method—viz., domestic filtration—and having said that, the difficulty is right before us. What form of domestic filtration, if any, can possibly be suggested with any prospect of success? The ordinary filters, such as most of us knew them in years gone by, are to-day practically things of the past, or, at least, ought to be so; the principles upon which they depended for their vaunted excellencies having been scientifically exploded.

The Royal Colleges of Physicians and Surgeons of London are Dr. Priestley's authorities for making such a definite statement. Their prolonged and careful bacteriological investigations into the efficiency, or non-efficiency, of every filter in general use prove that the verdict must be "Not efficient." It was shown that the media were inefficient in that they did not prevent the passage of disease germs through them, but even at times added germs to the water which was passed through them for supposed purification! The filtering media generally employed for domestic filters are proved to be useless, or even worse; and the natural question arises, Is there any filtering medium, not in general use, that is trustworthy? Here, again, an answer is given definitely by the Colleges as the outcome of bacteriological experiments. Porcelain (specially prepared) and infusorial earth (a patent) appeared from such experiments to meet the case, and to offer a satisfactory filtering medium so far as scientific investigation goes. In both instances the pores of the material are so fine that the pathogenic germs are quite unable to pass through

directly from the unfiltered to the filtered water. These facts are incontrovertible, after the careful experiments that were carried out a few years ago in the laboratories of the Royal Colleges of Physicians and Surgeons in London by Drs. Sims-Woodhead and Cartwright-Wood. As the matter was then left, the summing-up was practically to the effect that there were only two filters worth anything—the Pasteur, depending for its efficacy upon a specially prepared form of porcelain, and the Berkefeld, depending for its efficiency upon infusorial earth, both in the form of bougies. The output in the Berkefeld is quicker than that in the Pasteur; but the Berkefeld tubes are much more fragile and somewhat more costly.

As regards the Berkefeld filter, an important research by Dr. Horrocks, of the Army Medical Department, carried out in the laboratory at Netley, has now put the question beyond a possibility of doubt, and proved conclusively that this filter is not independent of the character of the water used. His experiments prove that infusorial earth (Berkefeld) filters allow, if they do not actually favour, the passage of typhoid germs within a few days of use, unless they are regularly sterilized in the interval—a process which, for practical purposes, may be left out of the question; while the ordinary Pasteur-Chamberland filters, similarly treated, and used experimentally, *in no case* allowed the passage of typhoid germs. It has been suggested that in this fact is to be found at least a partial explanation of why the British Army during the late South African campaign suffered from typhoid fever to such an alarming extent; the field forces being stated to have been equipped entirely with Berkefeld filters. Britain's experience in this respect is different from that of France, in connection with whose army M. de Freycinet, the War Minister, reports that "wherever the Pasteur filter has been applied, typhoid fever has disappeared."

To-day, therefore, the only actually trustworthy filter on the market would appear to be the Pasteur-Chamberland; and as its efficacy, as far as experiments have yet gone, remains from a scientific point of view unassailed, it may be trusted to fulfil its duty, and prove and maintain what is said of it. The Pasteur-Chamberland filter may be regarded as, at present, the standard filter; and no filter can be regarded as safe unless it reaches the same standard. The necessity for not departing from Pasteur's standard in regard to domestic water filtration goes without saying, but may be further emphasized here. Standards of demonstrated efficiency must in public health work be always worked up to, and not departed from, or lowered, if we wish to avoid trouble in the future. Should the standard Pasteur-Chamberland, or any other filter which has been brought to a similar high degree of bacteriological efficiency, be adopted universally in all houses? This is the question which water engineers have to answer, and the lecturer leaves them to do so, resting satisfied in having laid the up-to-date bacteriological facts before them. It may seem invidious on the part of water engineers to admit that, with ordinary care, there is a possibility even of polluted water being offered to the consumers, but such is, nevertheless, the case. Water engineers must pocket their *amour propre*, and consider what is best for the consumers, so as to protect them against even the shadow of a chance of infection by water-borne disease. Forewarned is forearmed. Cases of cholera, dysentery, diarrhœa, &c., as well as of the better known typhoid fever, may in this way be at least lessened, if not done away with altogether. The purchase of such a domestic filter is certainly a good investment, and may be regarded as an insurance, the premium payable being infinitesimal, and one which should be at once incurred personally by all water consumers, or, on their behalf, by members of sanitary authorities, or water boards, if absolute protection is to be secured against water-borne disease. A scientifically accurate filter may be regarded as a sure protection against water-borne disease, just as recent revaccination is against an attack of small-pox. An untrustworthy filter is as unreliable as an insurance policy in an unsound company!

The lecturer was heartily thanked on the motion of the PRESIDENT, seconded by Mr. PRIESTLEY (Cardiff); but, in his response, Dr. PRIESTLEY regretted that the lecture had not been subject to debate. Touching on a question that had been put to him privately, he described how it was possible, where there was only a microscopic crack in a main, from which there could be nothing more than an oozing of water, for a colony of bacteria to gradually extend into that crack, and then get snapped off, and carried along in the water.

Mr. W. TERREY (Sheffield), encouraged by the observations of the Doctor, passed a few criticisms on the subject, from which he appeared to consider that the suggestion of the lecture was that the consumer should take over the filtration of his water supply in place of the water undertaking; and he humorously remarked upon the comfortable position water undertakings would be in if they could manage to shelve the filtration on to the consumers in this manner. He had, he said, fixed many of the Berkefeld filters; but the tubes were costly and somewhat delicate; but he supposed the idea was that, if the consumers would take up such an insurance (as the Doctor put it) in the way of these small filters, it would do away entirely with the construction of expensive sand filters—if the consumer was really protected on his own premises. There was, however, another thing to be considered, and that was the extraordinary effect that soft water had upon the distributory apparatus in setting up incrustation, &c. The Liverpool Corporation had conducted a long, costly series of experiments, which showed that the unfiltered water between Vyrnwy and the filter-beds at Oswestry worked most energetically on the pipes, and almost closed them; while the filtered water after it left Oswestry had no effect whatever upon these pipes, and they were as clean as the day they were put in. No private or domestic filtration would overcome this difficulty.

Dr. PRIESTLEY said he acknowledged the admirable work that water engineers were doing with sand filtration; and he assured them that he did not suggest they should do away with it. In many cases, however, the water was filtered miles away; and it was impossible to suppose that from there to the consumers' mouths, everything would go on all right. It was to prevent a risk (which was a distinct risk) that he had written his paper.

Mr. PRIESTLEY (Cardiff) said his experience did not coincide with that of Liverpool. He found no difference in the amount of incrustation before and after filtration.

Mr. W. WATTS (Sheffield) observed that, if he understood the Liverpool experiments rightly, the line of conduit between Vyrnwy and Oswestry had practically no fall; and therefore the pipes were actually part and parcel of the reservoir, and sedimentation would naturally occur in them. He thought this was the fact of the case, so far as he had been able to read the reports that had been presented.

Mr. TERREY replied that some of the ablest chemists in the kingdom had been consulted in connection with the Vyrnwy experiments; and they had so satisfied themselves that the effect of sand filters was practically to remove the power to act upon the inside coating of pipes, that it had been decided to construct additional filter-beds so as to prevent that action.

Dr. PRIESTLEY explained some further experiments which, as they were incomplete, he desired should not be reported. They had reference to his previous point as to the power of bacteria to enter a microscopic crack. Upon this,

Mr. C. E. JONES (Leyton) inquired the pressure of the water upon the pipe in which the experiments were being made; but this question Dr. Priestley could not definitely answer. The importance of the point was recognized by the members; and it will be equally plain to readers.

Following this came an interim report from the Committee (consisting of the President, Mr. W. Watts, and Mr. H. W. Pearson, with Mr. Percy Griffith as Secretary) who are considering the question of the

STANDARDIZATION OF CAST-IRON PIPES.

The Committee stated in the report (which extended to five printed octavo pages) that, in order to ascertain the views of the leading water-works engineers and principal pipe-founders as to the desirability and feasibility of adopting some satisfactory basis for standardization, and the amount of support likely to be secured in the event of the matter being put into practical shape, they sent out a circular, to which they had received 119 replies, the tenour of which may be tabulated as follows:—

	Consulting Water Engineers.	Representative Water Engineers.	Pipe Founders.	Total.
Unqualified approval without remarks or suggestions . . .	8 ..	27 ..	5 ..	40
Unqualified approval with remarks and suggestions. . .	13 ..	41 ..	15 ..	70
Partial or qualified approval. .	2 ..	5 ..	— ..	7
Unqualified disapproval . . .	— ..	2 ..	— ..	2
Total . . .				119

The general result of this preliminary inquiry being, beyond question, favourable to further action, it appeared to the Committee very desirable that the question should be brought forward at the annual meeting—partly for the purpose of informing members and others interested of the results of the inquiries, and partly for the purpose of securing a discussion.

With the latter object in view, they referred to the principal points that have been raised as the result of inquiry so far—

(1) That varying standards should be adopted for varying pressures. In the Committee's opinion, there can be no doubt that this is essential if the standards are to be rendered capable of general application; but it is also evident that, if manufacturers are to be expected to stock the standard pipes to any practical extent, the number of standards for each size of pipe must be kept as low as is reasonably possible.

(2) That the standards should be limited to the smaller diameters, as, for example, those under 16 inches. It would evidently be unnecessary and absurd, remark the Committee, to include large diameters, which are only required by some five or six undertakings throughout the country.

(3) That standardization should extend to water-fittings, rules and regulations, pipe-flanges, specials, and coating of pipes. The Committee think these questions would be better dealt with independently of that of cast-iron pipes. The standardization of pipe-flanges, they also say, has already been taken in hand by the Institution of Mechanical Engineers; and they consider it should be specifically omitted from the present investigation. The standardization of special pipe castings is, of course, closely allied to that of cast-iron pipes generally, and should be carefully considered, together with all such kindred questions as coating, method of casting, and testing of pipes.

(4) That in any scheme of standardization metric measures of weight and dimensions should be adopted. The Committee are hardly prepared at the present time to give a final opinion on this point; but, judging from the results of previous attempts to alter our national standards, they have little doubt that this suggestion will have to be abandoned as impossible—at any rate for the present.

(5) That solid lead joints should be provided for, as well as lead and yarn. This seems, in the view of the Committee, a matter which may fairly be left for further consideration.

(6) That standards for any given size of pipe should be based upon external diameter rather than internal. The Committee mention that this system has been adopted by the New England Water-Works Association, of Boston, Mass., in the scheme of standardization recently promulgated by them.

(7) That before adopting any definite scheme of standardization, the views of the leading consulting engineers and pipe-founders should be obtained.

(8) That the whole question should be referred to a Commttee.

The Committee urge that before details are decided upon, they should be submitted to all intimately associated with the industry, and as far as possible modified to meet any views that might be expressed by them. In fact, it appears—at least, for the moment—that the most effective procedure would be either by a general conference of all engineers and manufacturers interested in the matter, or, should such a conference be impracticable, by some form of *plébiscite*. In conclusion, they refer to the progress made by the New England Water-Works Association, in connection with the subject, and suggest a mutual exchange of opinions and printed matter between the two Associations.

Discussion.

Upon the report there was considerable discussion, which was opened by

Mr. F. Gandy (Chesterfield), who said the report indicated that the majority of those who had been circularized were in favour of the standardization of cast-iron pipes. At present, the details and difficulties of standardization were apparently not before the Committee. There were, for example, the variations in conditions, in the ground, and in the character of the district—whether it was a colliery or ordinary one. He was present at some of the meetings in the States when the question was discussed. It was eight years since it was mooted there; to-day they had not arrived at a practical system of standardization, suitable to all conditions, nor acceptable by all engineers. It was a difficult problem; but no doubt it was one that could be overcome. It was certain that standardization would mean a better quality of article, supplied at a lower price. It would compel manufacturers to work with set specifications; and, each firm having to work to few specifications, they would be able to get a fair comparison of work. Those who supplied the best article for the least money would be the ones to come to the front. Speaking as a manufacturer, he referred to the difficulties sometimes put into their way by engineers, and then stated that he believed the manufacturers were unanimous in wishing for standardization as they would have to carry fewer patterns in stock. This would enable them to go into the details of manufacture in a way they had been unable to do hitherto; and their productions would be more refined and more exact.

Mr. W. Ingham (Torquay) coincided with the suggestion as to the standards being limited to the smaller sizes of pipe. He also commented upon the variation of opinion existing regarding the adoption of the metric system; and, personally, he considered it better to keep to our own measures—at all events, for the present. He was not altogether at one with those who suggested the fifth recommendation; but he was in favour of the sixth. He also alluded (as being an important point for consideration) to the question of the condition of castings before being dipped.

Mr. H. G. Keywood (Maldon) said it seemed to him that a *primâ facie* case had been made out for the standardization of pipes, and he suggested that the Council should communicate with the Pipe-Founders' Association (if there was one in existence), or to the pipe-founders individually, and ask them to appoint a small Committee to meet the Special Committee of the Association.

Mr. W. H. Humphreys (York) hoped that whatever else was done the question of the coating of pipes would form part of the inquiry.

Mr. Gandy said he might make a remark upon this. The coating question had been having more attention the last two years than ever before. Mr. Parry, of Liverpool, had gone so far as to have castings dipped into pure linseed oil; and this, it appeared, prevented incrustation. It gave a much smoother finish. Afterwards the pipes were dipped in a bath of Dr. Angus Smith's solution, heated to about 300° Fahr., and left for about fifteen minutes. After this, they were again immersed, and a second coating applied. Mr. Parry had submitted pipes so treated to various kinds of tests, but had not been able to penetrate this double coating.

Mr. Humphreys said there was no doubt the coating Mr. Gandy spoke about would be very effective under certain circumstances. But he should like the Committee to go into the question of getting a coating that would not be affected by water at any temperature. Speaking of long lengths of pipes that had lately been laid, he had found that, when the water reached a temperature of 55°, the coating of the pipe affected the water. What they wanted to get at was a coating that would not, under all varying circumstances, affect the water.

Mr. W. Matthews (Southampton) was not surprised the New England Association had not succeeded in doing what they wished, seeing that they had been endeavouring to adopt standards for 4-inch up to 60-inch pipes, with test pressure from 150 lbs. to 400 lbs. per square inch (divided into seven classes). They had been trying to do too much. He suggested to the Committee that they should get two or perhaps three sets of standards that would be applicable to the great majority of cases in this country, and leave the exceptional cases to take care of themselves. If not, the whole thing would be hampered. He further suggested that, by way of trial, 12-inch diameter pipes would be high enough for the Committee to go to. He further expressed himself as being strongly of opinion that the investigation should at the present time be confined to the question of cast-iron pipes and special castings; and, on the ground that it would hamper the question, he also opposed the introduction of the metric measures at the present time. In other remarks, he was in favour of the standards for any given size of pipes being based on the external rather than the internal diameter.

Mr. Percy Griffith, as the Secretary to the Committee, replied to various inquiries that had been made, but which are not noticed in this summary of the discussion. He mentioned, however, that no resolution would be considered on this interim report; but the suggestions that had been thrown out would be carefully discussed by the Committee, and ultimately by the Council—in fact, further action would be taken very soon indeed. As to Mr. Humphreys' remarks, that gentleman had gone very thoroughly into the question of the coating of pipes, and had been good enough to submit to the Committee a paper recording his own experience. He (Mr. Griffith) thought it probable that the Committee would be only too glad to lay the communication before the members.

Votes of Thanks.

At the close of the technical proceedings, there were a number of votes of thanks passed—First, in recognition of the kind and generous hospitality the Association had received at the hands of the Mayor and Corporation; secondly, to the authors of the various papers submitted for discussion, as well as descriptive of the water-works in the neighbourhood; thirdly, to the President for the handsome manner in which he had arranged for the reception and comfort of the members (in acknowledging this, he paid a thoughtful tribute to the warm support he had received from his chief Assistant and the rest of his staff); and, lastly, came one to the Council and officers, in connection with which the assiduous and unselfish manner in which Mr. Griffith performs his work for the Association was very enthusiastically recognized.

The Social Side.

The annual dinner was held on Wednesday evening in the Mayor's Rooms, at the Museum Buildings. There was a goodly company; a large number of local gentlemen having accepted the invitation of the Council to be present. His Worship the Mayor, occupied the seat at the right-hand side of the President, and Sir Thomas Wright (whose work on the Town Council will live in the history of the borough) was seated on his left. Among the Corporation officials who came to aid in doing honour to the President was Mr. Alfred Colson, the Chief of the Corporation Gas and Electricity Departments. The dinner was on a sumptuous scale, the music and songs which interspersed the after proceedings were good, and the speeches which accompanied the toasts ran to a high order of eloquence. The predominating topic, of course, was the water supply of Leicester; and, his Worship having been the Chairman of the Water Committee for fourteen years, and the President having occupied his position for close upon a quarter-of-a-century, both were able to give much from their experience of the past, and tell of their successes and times of hardship and anxiety. The proceedings continued until a late hour, but so enjoyable were they that there must have been few among those present who did not regret their termination.

But next day, on their visit to the Bradgate pumping-station at Cropstone (referred to elsewhere), the members were in turn entertained by the Mayor in a large marquee on a part of the beautiful ground surrounding the station. The entertainment was a royal one; but what astonished the visitors was not a matter of surprise for the many members of the Corporation and leaders in Leicester who were present, and who seem to have grown accustomed to such evidences of the large-heartedness of Alderman Wood, whose aim and ambition appear to be to give the greatest happiness possible to the greatest number. Alderman Wood annually, as Chairman of the Water Committee, invites his fellow members, the officials of the Corporation, and some of the citizens to inspect the water-works. (This, by the way, is found to be a good policy.) This year, in view of the visit of the Association, he amalgamated the two events. Altogether, there were 200 sat down to luncheon; and his Worship, as the host of the day, occupied the central seat at the head table. The toast list was commendably short; but the speeches

were uncommonly good. There is no doubt about it that the Mayor is a born orator; and he took advantage of the occasion to put the people of Leicester in possession of some plain facts concerning their water supply, and especially regarding the Derwent Valley works, in which Leicester is a large partner. The great inroad on our space this week by this meeting prevents the publication of a report of the speeches; but this luncheon at Cropstone, the Mayor's earnest words of appreciation of the profession of water engineering, and the able defence of the policy of the Water Committee past and present will live long in the memories of those who were there.

The President, it should be stated, was also most hospitable; and his entertainment took the form of kindly thoughtfulness for those occasions when it was heartily appreciated. During the midday adjournment on Tuesday, the President held himself responsible for lunching the members in the ante-room of the Council Chamber; he also provided tea at the Swithland reservoir on Wednesday's visit, and the same night his liberality caused the members to all assemble at the Grand Hotel, and enjoy a smoking concert, the programme for which was of the first order. At the Northampton Water-Works, too, on Friday, the Association were again received most kindly.

Visits to Works.

As already intimated, the members on Wednesday visited the Bradgate pumping-station, storage reservoir, and grounds at Cropstone. They adjourned their morning sitting early in order to do this; and the treat they had fully compensated for the shortening of the technical proceedings. The station at Cropstone is perhaps the most artistically laid out water-works to be found in the whole of the United Kingdom; and, at this time of the year, it is seen in its full glory. It was one of the pet water schemes of the late Mr. Thomas Hawksley; and the work was done and the ground laid out and planted with a lavish hand, such as would be undreamed of to-day. With time, the work of the master has improved by the process of natural development, and its beauty is maintained by the care expended upon it.

We cannot describe the works fully; but, from a printed account prepared by the President, we learn that the Bradgate works were constructed under an Act obtained in 1866. The source of supply is the rainfall collected from a drainage area of 4400 acres; the contents of the reservoir being 556 million gallons. The water is filtered and pumped from the pure-water tank to Gilroes service reservoir, containing 2 million gallons, and from thence gravitates to the distribution system. The pumping plant consists of two installations, the first of which was laid down in 1870, and comprises two Wolf beam pumping-engines and four boilers. The second installation comprises a triple-expansion, inverted, direct-acting pumping-engine of the marine type, capable of pumping a million gallons in twelve hours. The filter-beds are a feature of the place.

The luncheon which the members enjoyed in these pleasant surroundings is referred to elsewhere. In the early part of the outward journey, there was a little rain, but fortunately it soon ceased, and, though dull, it had no depressing effect upon the members among such exuberant evidence of friendship and generosity on the part of the Mayor. By the kindness of the Countess of Stamford and Sir Thomas Wright, the return journey was made by way of Bradgate Park.

The same evening the members visited the Corporation Water-Works Offices to inspect samples of standard fittings adopted by Leicester and other towns. The exhibits were both interesting and instructive; and some of the members seemed to think that future Presidents would do well to follow Mr. Griffith's example, and bring together similar collections for inspection when the Association were meeting in their towns.

After lunch on Thursday, brakes conveyed the members first to the Swithland reservoir and water-works; and they were found to rival the Bradgate station in their cultivated beauty. Turning again to the President's descriptive account of the works, we find that they were sanctioned in 1890; and Mr. J. B. Everard, M.Inst.C.E., acted as Engineer. The plant at this station consists of two triple-expansion, inverted, direct-acting pumping-engines, each capable of pumping 800,000 gallons in twelve hours against a head of 350 feet through a rising main 20 inches in diameter. The engines were built by Messrs. Easton and Anderson, of Erith. There are four boilers; and a Green economizer. The storage reservoir, pure-water tank, and the Hall Gates service reservoir are each connected with the pumping-station by electric recorders. A third engine is now being constructed capable of pumping a million gallons in twelve hours. The station is lighted by electricity, generated on the spot. The source of supply is the rainfall collected from a drainage area of 3500 acres. The storage reservoir contains 490 million gallons; and the water, after being filtered, is pumped from the pure-water tank to the Hall Gates service reservoir, whence it gravitates to the distribution system. In addition to the Bradgate and Swithland works, there is the Thornton station; but this was not visited.

Leaving Swithland, the visitors drove to the Blackbrook reservoir of the Loughborough Corporation, where a masonry dam in course of construction was open to inspection by the courtesy of Messrs. G. & F. W. Hudson, the Consulting Engineers. They were the authors of a descriptive pamphlet which was distributed among the members, by which one was reminded (and not for the first time during the week) that Leicester, in the parliamentary session of 1886, had joined issue with Loughborough for the possession of these works. However, it was the reservoir works that the visitors had gone out to see; and here are a few particulars: At the site of the dam, the width at the top-water line is only 439 feet, and the sides of the valley attain a height of 400 feet on each side. At a distance of 350 yards back from the dam, the reservoir widens out to half-a-mile—the extreme length being within a few yards of a mile. The capacity is 506 million gallons, the top-water area 84½ acres, and the yield 2 million gallons per day. The extreme length of the dam is 525 feet, its height to the overflow crest is 65 feet from the brook level, 93 ft. 6 in. from the bottom of the main trench, and to the top of the parapet 108 feet. The thickness at the brook level is 65 feet, and at the level of the overflow 15 feet. Below the bottom of the main trench, a narrow safety trench is being excavated to the depth of 20 feet, to cut off any transverse fissures which may exist and to get below some small springs which are still troublesome. The Contractors for the works are Messrs. H. Fotherby and Son, of Burnley, who were the lowest tenderers. The Engineer's estimate for the works comprised in the contract was £61,476; and twelve tenders received ranged from £84,812 to £58,707.

On arriving near the works, the visitors walked through the site of the reservoir to the excavations for the dam. Here they were met by the Mayor of Loughborough (Mr. R. Sutton Clifford), the Chairman of the Water Committee (Mr. J. Cartwright) Messrs. G. & F. W. Hudson, and Mr. Fotherby. There was an exchange of courtesies between the President, the Mayor, and the Contractors. Light refreshments were provided in a tent; and the visitors drank heartily to the prosperous termination of Loughborough's great water enterprise. The inspection occupied more time than had been anticipated; and the hour was late when the members once more reached Leicester, notwithstanding that a prompt alteration in plans at Loughborough brought the travellers from there by train, instead of brakes.

By 9.35 on Friday morning, the members were entrained, and a few minutes afterwards were *en route* for Northampton. About 11 o'clock they reached that great industrial centre, and found conveyances in readiness to carry them to the Billing Road pumping-station, where a reception was held by the Mayor of Northampton (Mr. F. G. Adnitt, J.P.), and the Chairman of the Corporation Water Committee (Mr. J. Jackson). There was here an inspection of the works and of diagrams showing the effect of pumping on the level of the water over a number of years. A further drive brought the visitors to the Stimpson Avenue works; and there luncheon was served, the Mayor contributing largely to the pleasure of the occasion. Subsequently, the Ravensthorpe works were visited, to reach which there was a pleasant drive of some 9 miles. The journey back to Northampton was made *viâ* East Haddon.

In a description of the works, Mr. Frank Tomlinson (Engineer) states that the Billing Road works comprise two wells receiving their principal supply from the marl stones of the middle lias, which is here covered by about 140 feet of blue clay. The well inspected has a diameter of 8 ft. 6 in. and a depth of 151 ft. to the invert of the brickwork, through which a 30-inch pipe passes to a further depth of 18 feet. The other well (which was not seen) has a diameter of 7 feet, and is sunk to a depth of 160 feet. The two wells are connected by a heading 90 ft. long by 6 ft. by 6 ft. The yield of the wells is about 400,000 gallons in 24 hours. The pumping machinery consists of two Lancashire boilers, an engine, and three-throw pumps. The Stimpson avenue works consist of two covered service reservoirs 15 feet deep, with a total capacity of 3 million gallons; a tower 60 feet high, with a tank 9 feet deep, holding 50,000 gallons; two Tangye's single-cylinder pumps, each capable of lifting 20,000 gallons per hour into the tower tank; and two Cornish boilers. The Ravensthorpe works were designed and carried out by the late Mr. Thomas Hawksley. The reservoir here is the feature. The length of the bank is 444 yards, its greatest depth 33 feet, and the width of the base 230 feet. The puddle core is carried not more than 16 feet into the original subsoil, and has a width of 12 feet at the bottom, tapering to 15 feet at the base of the bank, and to 6 feet wide at the top of the bank. The bye-wash has a width of 60 feet at the top water-level, and discharges into a channel gradually reduced to 20 feet wide by 4 feet deep. The top water level is 348 feet above Ordnance datum, and has an area of 113¼ acres. The capacity of the reservoir is about 400 million gallons. There are four filters, 9 feet deep, and with an area of 7362 square yards. There is also a slate covered pure-water tank, with a capacity of 64,000 gallons. The pumping machinery comprises two Worthington engines, each of a capacity of 1000 gallons per minute.

At Northampton Railway Station, the members parted for their various homes; and thus ended a meeting which will hold for all who were present many happy reminiscences.

Messrs. Ashmore, Benson, Pease, and Co., Limited, of Stockton-on-Tees, have just been favoured with the order from the Leicester Corporation for the large new gasholder and guide-framing to be erected alongside the other holder of the same size put up by the firm some years ago at the Aylestone Road works. These holders are each 197 feet in diameter by 38 feet deep (in three lifts), with 22 cast-iron columns the full height.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Rate-Aided Competition.

SIR,—Upon reading what has taken place in reference to the ratepayers' protecting clause lately inserted in the Electric Lighting Order of the Bermondsey Corporation—thanks, no doubt, to the foresight of Sir George Livesey—I feel somewhat confused as to how this clause may work out in practice. As it appears to my understanding, the Local Authority, after establishing their electric light works and spending a large amount of capital on the undertaking, may incur a loss for the first year, but not afterwards, should they be challenged by the ratepayers. Here, it seems to me, comes in the query. If such loss is in evidence, there are only two ways, as far as I can see, of meeting the difficulty—viz., by showing to the arbitrator that there would be a reasonable probability of a greater demand for electric current during the second year, or that those consumers on the books would be willing to pay an advanced price for same. Now, supposing neither of these probabilities could be made apparent to the arbitrator, what is to happen? The clause I have referred to would prevent the Corporation carrying on their works at a loss; while to stop supplying current would be even more financially disastrous. Therefore the unfortunate ratepayer, as I see it, would be the victim under any circumstances.

Mr. Botley suggests, in your last issue, that the corporation may meet the case by charging an advanced price for street lighting. But, with Sir George Livesey in the neighbourhood, this would be hardly likely, I think, to take place at Rotherhithe without his having something to say on the proceedings. At any rate, it is to me a rather knotty question—a pure case of Scylla and Charybdis; and as a similar clause will probably be inserted in the Corporation Electric Lighting Orders of the future, I hope some enlightenment may be thrown upon so important a matter.

Abergavenny, July 25, 1902. S. CROSS.

Gas-Producers.

SIR,—Mr. Herring is rather late in patenting the arrangement illustrated in your last issue. I myself for the past eight years have put what we call a "curtain" towards the back of our producers, which, in working, is intended never to become unseated; and I do not think the idea is strange to others. What would be worth patenting is some mode of successfully introducing tar into what we call the "coke reservoir" of such producers. It is an ideal way to burn tar; but, although I have tried it in several works where I have put in these producers, I cannot claim to have succeeded.

My idea in using the curtain was to keep an unvarying depth of fuel; thus maintaining a more regular friction for the primary air, and a more constant quality of producer gas. A varying depth of fuel means varying friction of primary air, and consequent disarrangement of the balance with the secondary air.

R. BRUCE ANDERSON.

35A, *Great George Street, S.W., July* 24, 190[2].

Power for the Westinghouse Works.

SIR,—Referring to your "Note" *re* the British Westinghouse works in the "JOURNAL" for the 22nd inst., I beg to inform you that these works, as well as all others in Trafford Park, are in the area of the Stretford Gas Company, and that my Company are at present engaged in laying mains for the exclusive use of the British Westinghouse Electric and Manufacturing Company.

My Company supply all the coal gas that is consumed in the Park area. The discussion you refer to in the Manchester Corporation Council had probably more reference to the large introduction of electro-motors within the City boundaries, as the Mond gas made by the Trafford Park Power Company, Limited, can only be supplied within the Park area, and has not, up to the present time, more than emerged from the experimental stage at the Power Company's works in Trafford Park—the latter Company having only just commenced laying their mains.

Stretford Gas Company, July 26, 1902. H. KENDRICK, Engineer.

Keeping Clean Incandescent Burners.

SIR,—As supplementary to the letter of Mr. Carpenter in your last issue, I would suggest the employment of a small band of muslin or fine net, to be placed round the air-holes, in order to keep back dust, the in-draught of which seriously impairs the efficiency of incandescent burners, especially in shops. Of course, the holes require to be a little larger than is otherwise necessary; but most burners have plenty and to spare of air entries. The muslin or net should be occasionally renewed.

Brecknock Road, N., July 23, 1902. A. CLEVERLY.

Brentford Gas Company.—Subject to audit, the accounts of this Company enable the Directors to recommend dividends for the past half year at the rates of 5, 12, and 9 per cent. per annum, carrying forward £35,351.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills Royal Assented: Bedford Corporation Water Bill, Belfast Corporation Bill, Bradford Corporation Bill, Bristol Water Bill, Broadstairs Gas Bill, Buxton Urban District Council Bill, Chard Gas Bill, Commercial Gas Bill, Gas Orders Confirmation Bill (No. 1), Halifax Corporation Bill, Huddersfield Corporation Bill, Kent Water Bill, Knaresborough Improvement Bill, Leamington Corporation Bill, Local Government (Ireland) Provisional Orders (Gas) Bill, Local Government Provisional Order (Gas) Bill, Paisley Gas Provisional Order Confirmation Bill, Rickmansworth Gas Bill, South Metropolitan Gas Bill, Ticehurst Water Bill, West Gloucestershire Water Bill, West Ham Gas Bill, West Hampshire Water Bill.

HOUSE OF COMMONS.

Friday, July 25.

The Cost of Providing Fire-Hydrants.

Mr. ARTHUR LEE asked the President of the Local Government Board whether it was the rule that Local Government Board Auditors should disallow to Parish Councils the payments made by them for the provision and maintenance of fire-hydrants by local water companies; and, if so, whether he would take steps to have the rule altered, and Auditors instructed to pass such payments. If the rule could not be altered, he asked him to explain how Parish Councils, who have the power of providing a fire engine and escape under the Local Government Act of 1894, could ensure a supply of water in case of fire.

Mr. LONG: The law does not empower Parish Councils to provide and maintain fire-hydrants, and I have no authority to instruct the District Auditors to allow in the accounts of these authorities payments for a purpose for which they cannot legally incur expenditure. As regards the concluding part of the question, the Rural District Council may be invested by the Local Government Board with the powers of section 66 of the Public Health Act, 1875, with respect to the parish, and the necessary application for this purpose may be made by the Parish Council. It would then be competent to the Rural District Council to provide fire hydrants for the parish.

The following further progress has been made with Bills:—

Lords Bill read a second time and committed: Gas and Water Orders Confirmation Bill (No. 1).

Lords Bills reported: Margate Corporation Water Bill, Nottingham Corporation Bill.

Lords Bills read the third time and passed: Consett Water Bill, Weardale and Shildon District Water Bill.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Friday, July 18.

(*Before Lords Justices* VAUGHAN WILLIAMS, ROMER, *and* STIRLING.)

Barnard Castle Urban District Council v. Wilson and Others—The Supply of Water to a Swimming-Bath.

This was an appeal by the plaintiffs from the decision of Mr. Justice Buckley, as reported in the "JOURNAL" for Aug. 13, 1901, that water supplied to a swimming-bath was a supply for domestic purposes.

Mr. UPJOHN, K.C., and Mr. LUSHINGTON appeared for the appellants; Mr. LAWRENCE, K.C., and Mr. R. C. GLEN for the respondents.

Mr. UPJOHN said the plaintiffs were empowered, under the provisions of the Public Health Act, 1875, to supply water to the inhabitants of Barnard Castle; and the defendants were the Governors of the North-Eastern County School, in which there was a swimming-bath holding some 35,000 gallons of water. The question at issue was whether the Governors were entitled to have the bath supplied with water without any payment beyond the ordinary rate. Plaintiffs contended that the supply was not a "domestic purpose," and that therefore an extra payment should be made in respect of it.

Lord Justice VAUGHAN WILLIAMS: Would you say that with regard to a supply to a swimming-bath in a private house?

Mr. UPJOHN said his contention was, first, that this supply was not a "domestic purpose;" and, secondly, that, having regard to the facts of the case, it was a supply for trade purposes, because the boys who used the bath were charged a certain amount per term for it. It appeared that the bath was constructed in 1896, in a separate building from the school-house, approached by a corridor, and was rated separately at £10 a year. Before it was made, the Clerk to the Governors communicated with the Clerk to the Urban District Council, and, after some correspondence, the latter agreed to supply water for the bath at the rate of 3d. per 1000 gallons; the ordinary charge to traders or manufacturers who used water for other than domestic purposes being 6d. This went on for some time, until the spring of 1899, when the District Council found that they could not afford to supply the water at 3d., but must charge 6d. per 1000 gallons for it. The

Governors thereupon declined to pay any extra, and claimed that they were entitled to use the water for the bath as a portion of the domestic supply. Having referred to section 51 of the Public Health Act, 1875, which gave to an urban sanitary authority power to provide a water supply, the learned Counsel said his points were two: First, that water for a swimming-bath did not form part of a supply for domestic purposes; for if everyone chose to put a swimming-bath into his own house, it would be impossible for them all to be supplied. Secondly, even if private persons were entitled to build swimming-baths, and supply them from the mains, in this case the bath was part of a trading concern—viz., a school. Having quoted several definitions of the word "domestic," Counsel went on to point out the distinction between an ordinary fixed bath and a swimming-bath. There might here and there be a person who had a swimming-bath attached to his house; but, speaking broadly, everyone who wanted to swim had to go away from home—out of the *domus*; and this showed that water so supplied was not for a domestic purpose. He suggested that if one man was entitled to have a swimming-bath, another would be equally entitled to have a lake large enough for boating. After arguing this matter for some time, Counsel went on to his second point—that this supply was for a trade, and that it was none the less so because any profits arising were not divided, but went to add to the endowment. There was a broad distinction between this swimming-bath and fixed baths in boarding-houses, used by the boarders.

Mr. LUSHINGTON followed, and read the judgment of Mr. Justice Buckley. He submitted that the supply of water to the bath in question could not be deemed to be for domestic purposes.

Mr. LAWRENCE supported the decision of the Court below, but had not proceeded far with his argument when the Court rose.

Saturday, July 19.

Mr. LAWRENCE continued this morning his argument on behalf of the respondents, and cited several previous cases, including the Sheffield, Liskeard, and Great Yarmouth decisions. He urged that the teaching of swimming at this school was only a small part of the general curriculum—it was a very different thing from a swimming-bath carried on independently as a business. He did not admit that the bath in question was separate; it was not so according to his instructions, and it was certainly not so found in the case. His contention was that any appendage to a house or premises which added to the rateable value came within the meaning of the phrase "used for domestic purposes." If the bath were emptied and filled every day, it would still be a domestic use, but it would be such an unreasonable or excessive use as was forbidden by one of the sections.

Mr. GLEN having addressed a short argument to the Court, to a similar effect, urging that Mr. Justice Buckley had come to a right decision in holding that the water in this case was used for a domestic purpose,

Mr. UPJOHN replied. He submitted that neither of his learned friends had given any definition of the words "domestic purposes" which would include a swimming-bath. He also pointed out the importance, in the interest of the public, of the words being reasonably limited, in order that the whole community might be assured of a supply of water for absolutely necessary purposes; the public authority or water company having the power of witholding the supply for trade or other purposes, in case of deficiency. If the defendants' contention were to succeed, they would have the same right to draw the enormous quantity of water required for their bath, however short the supply might be, as any other occupier who only needed a small quantity.

Having considered for a few minutes, their Lordships proceeded to deliver judgment,

Lord Justice VAUGHAN WILLIAMS said the case was a troublesome one, and, in his opinion, it depended entirely on a question of fact, as to which, of course, different minds might arrive at different conclusions. They had not in this case, according to his view, very complete information as to what the circumstances were from which to draw the inference of fact in question. He himself thought that, in construing an Act of Parliament, it was not right to ask oneself, first, supposing it were an enabling Act: Was the particular case one which it would have been right or reasonable for the Legislature to include within the enabling powers of such and such a section? He thought it was not a sound way of approaching the particular case with which they had to deal to ask: Was it likely that the Legislature, when they passed the two Water-Works Clauses Acts of 1847 and 1863, intended large swimming-baths for schools to be included? In substance, it seemed to him that a great deal of the argument which Mr. Upjohn addressed to the Court was really based on the suggestion that it was not likely that the Legislature should have intended to put the local authority in such a position that they should be under an obligation to supply a large swimming-bath with water. But he did not think they had any right to deal with the Act of Parliament in that way. They ought to look at the words of the Act, and, unless their actual construction would lead to an absurd result, the words ought to have attached to them their natural meaning. The first of the Acts in question was that of 1847, section 53 of which enacted that every owner and occupier of a dwelling-house, or part of a dwelling-house, should be entitled, on fulfilling certain conditions, to demand and receive from the undertakers "a sufficient supply of water for his domestic purposes." The question was: What was the meaning of the words "for his domestic purposes" when used in relation to the owner or occupier of a dwelling-house? Looking at the decided cases in connection with this section, it was plain that one could not say either that the domestic purpose must be one which was to be attained inside the dwelling-house itself, or that it must be such as was essential to the occupation, or even to the healthy occupation, of the house. It was plain, on the cases, that there was no such limit. Before referring to those cases, however, he would say a few words about the second Act—the later statute of 1863. Section 12 of this Act provided that the supply of water for domestic purposes should not include a supply "for cattle, for horses, or for washing carriages, where such horses or carriages are kept for sale or hire or by a common carrier, or a supply for any manufactory, trade, or business, or for watering gardens, or for fountains, or for ornamental purposes." The inference he drew from this express statutory exception was that things of the kind mentioned in the exception would, and did until the passing of that Act, fall within section 53 of the Act of 1847, and it was necessary to have an express provision to shut them out. There was a curious example of this in the case of *Busby v. Chesterfield Water-Works Company*. In that case, the Company were required by an occupier to supply water for the purpose of washing the carriage in the coach-house and for the horse in the stable, which formed part of the premises; and it was held that he was entitled to do so, the water being applied to "domestic purposes" within the meaning of the Act. Lord Campbell said the horse and carriage were for private use, and were kept on the premises; and that being so, the water used for them was employed for a "domestic purpose." Mr. Justice Crompton and Mr. Justice Earle agreed with the decision. After that case, it seemed impossible to say that water supplied for the purpose of making a house more convenient, or increasing its amenities for its owner or occupier, was not supplied for a domestic purpose. That case was dealt with, and approved, in the case of the *Bristol Water-Works Company v. Uren*. Without going into the facts in detail, Justice A. L. Smith said at the end of his judgment: "In our judgment, water used for the mere amenities of the house such as in this case—the watering of the pleasure garden surrounding and attached to, and occupied with, the house—may legitimately and fairly be held to be used for domestic purposes within the meaning of the statute in question." He (his Lordship) had no doubt, on reading these two cases, that if the water was really employed for the more convenient occupation of the house, or for increasing its amenities to the owner or occupier, it was *prima facie* a user for domestic purposes; and he did not think that rule could be cut down by saying that the user must be one which was general. It was not usual to have swimming-baths, and therefore this was not a domestic use of water within the section. If this had been the true rule, and if the Court had decided according to the facts, they would have had to hold with reference to a fixed bath that it was not a domestic user of water, because one could have no doubt whatever that in 1847 the houses which had no fixed baths in them were in a large majority. He did not accept this limitation of the definition of "domestic user," which he considered to be simply a user which was for the purpose of making the house more convenient or more agreeable to the occupant. Another limitation suggested was that it must be reasonable. As to that, of course the measure of what was reasonable might depend on the capacity of the body which had to supply, or the wants of the person to be supplied. As to the capacity of the supplier, it seemed to him idle to say that these people were incapable of supplying, because they themselves affirmed their capacity to supply; only they said they must be paid 6d. and not 3d. per 1000 gallons. Mr. Upjohn met this by suggesting: "Suppose everybody in the country insisted on having a swimming-bath." The answer was that an Act of Parliament had to be construed according to the real facts and possibilities; and it was idle to suppose, not only that everybody would want a swimming-bath, but that in respect of most houses, or even large ones, such a thing would ever come to be true. Then it was said that the supply must be reasonable so far as the recipient of the water was concerned; but he could not see any trace, either in the Act of Parliament or in any of the decided cases, imposing any such limitation. In fact, when he put it to Mr. Upjohn, he had to admit that there was not a single case in which there was a hint of any such limitation Another matter necessary to be referred to was the exception in section 12 of the Act of 1863, which set forth that the supply of water for domestic purposes should not include, among other things, a supply for any trades, manufacture, or business. He agreed with Mr. Justice Buckley that carrying on a school was a business within the meaning of the words of the section; but he also agreed with him where, following the Yarmouth case, he said that the fact that the house was used for a business did not prevent a user for a domestic purpose by the resident in the house. If in the case of a large house used for a school or for a drapery or any other business, there was in addition a swimming-bath, or a large water supply of any sort or kind, this did not make it a supply of water for the business. It was for the domestic purposes of the residents in the house. Mr. Justice Buckley had arrived at the conclusion that the bath in the present case was one used for domestic purposes, to make the occupation of the premises by the 350 boys more healthy and agreeable. If this were the right conclusion, he (his Lordship) could not doubt that it was a domestic purpose within the meaning of section 53 of the Act of 1847, and that it was a use of water which did not fall within the definition of a supply for a "business." But there was a still further difficulty, because it was suggested that this conclusion of fact by the learned Judge was wrong, and that the proper conclusion to draw was that this bath was not erected or used for the healthier or pleasanter occupation of the school by the boys, but for the purpose of teaching swimming as part of their education. He thought it very doubtful. He understood, however, that both his learned brethren considered that this was the right conclusion of fact; and in a matter of this sort he did not think he ought to differ from them. He should have preferred to have had more information on this subject, as he did not like, in its absence, to differ from Mr. Justice Buckley upon this question of fact. But as he felt it was very desirable that one member of the Court of Appeal should not differ from his brethren on such a point, he would assent to the necessary judgment that this appeal should be allowed. He based his decision exclusively upon the fact that this bath was for the purpose of education, to make the school more efficient, and not to make the house more convenient and agreeable for the residents. Of course, the decision would not be applicable to any other case; and he wished to say for himself that, in his judgment, the supply of water for a swimming-bath for the use of the occupier of a house was, or might be, within the terms of the section.

Lord Justice ROMER said as the case gave rise to questions of great and general importance, he thought it right to state his views on some of the points. It had been argued, on behalf of the defendants, that the only test as to whether water was wanted for domestic purposes within the meaning of the Acts was to see whether or not it was being used or consumed by an occupier for the private purposes only of himself, his household, and his friends; and it was said that if it was so used and

consumed, then the water must be held to be wanted for domestic purposes. In his opinion, this test would be too large, and would not be a right one. He would give an example. Taking a case where water was supplied at high pressure, could an occupier use it as a motive power—say, for the purpose of driving a dynamo to generate electricity, if he used the electricity solely for lighting his house and premises? In his opinion, he could not, for such use of the water would not be for domestic purposes. Again, could an occupier of premises who had a house and very large garden call upon a water company for the amenities of his house and the enjoyment of his household and friends, compulsorily to fill a hole that he would dig, in order that he might use the pond for boating purposes? He thought not. He considered that this would not be a use of water for domestic purposes within the meaning of the Acts. He gave these two strong examples merely to show why he said that, in his opinion, the test suggested on behalf of the defendants could not be regarded as a proper one. It appeared to him that, in considering what was a domestic purpose, regard must be had to the ordinary habits of life in this country, and also to what could reasonably be considered such a purpose. He thought this would be shown by the provisions of section 17 of the Act of 1863, which expressly provided, among other things, that water should not be unduly consumed or wasted. In considering what was reasonably to be regarded as a domestic purpose, one must bear in mind not only the consumer, but the supply which a water company were bound to give. The importance of the point he was now dealing with was shown by the first rule connected with the water undertaking in question. It provided that, in case of a deficiency of water, the supply for domestic and sanitary purposes should have priority, and the suppliers should not during such deficiency be liable to provide water for any other purpose. It was a very serious question, therefore, if it was to be held that in every case where the occupier required water for his enjoyment and pleasure a water company should be held bound to supply it, without regard to the necessity of the ordinary purposes of drinking, washing, and sanitation. He would give one or two examples, with the view of showing what he meant by saying that a reasonable view must be taken of what was a domestic purpose. He quite agreed, for example, that if a householder kept a cat and a dog, he would be entitled to let these animals have water for drinking, and occasionally for washing them, and nobody would be disposed to say that in so doing he was not using the water for a domestic purpose. As it was held in one of the cases cited, if a man kept horses and carriages for his private use, it could reasonably be said that water employed for watering the horses and washing them and the carriages was water used for a domestic purpose. But there must be some limitation. Suppose a wealthy proprietor of large premises chose to keep other tame animals besides cats and dogs—for example, a tame elephant—would it be reasonable that he should call upon the water company to supply a special bath in order that the animal might be properly washed? He thought not. To take another case, would it not be a reasonable use of water for a domestic purpose if a person kept a small tank with gold-fish in it, such as were frequently seen in ordinary houses. He should say that no water company could reasonably complain that in putting water into that tank the occupier of the house was not using it for a domestic purpose. But suppose the occupier, being a wealthy man, desired to keep a private aquarium, such as existed in public places, and he wanted to have running water to keep alive a lot of valuable fish, including trout, he (his Lordship) should not be disposed to hold that that person could call upon the company to supply water compulsorily for the purpose of the fish in the aquarium. These deliberations led him to the conclusion that the consideration of each case that came before the Court must be approached with some regard to what was reasonable, and the circumstances of each case ought to be dealt with so as to see whether the user of water in that special case did or did not reasonably come within the requirements of a domestic purpose. With respect to the particular circumstance of the present case, he could only say he was not prepared to hold that every swimming-bath erected by the owner of a house and premises was something in respect of which he was entitled to call for a supply of water as for a domestic purpose. If a person of considerable means, having a large garden, chose to make therein a swimming-bath for his mere recreation or pleasure in acquiring or practising the art of swimming, he was not entitled to call upon the company compulsorily to supply that bath with water on the footing that it was required for a domestic purpose within the meaning of the Act of Parliament. Looking at all the circumstances of the present case, he (his Lordship) certainly thought the water required by the defendants was not for a domestic purpose. He need not go through the facts which led to this conclusion, as they had been discussed so fully; but it appeared to him that the bath was erected for the purposes of the school, and that the water was wanted for the business, and not for the domestic uses of the school, considered as a *domus* or home. This being so, the decision of the Court below must be reversed, and the appeal allowed.

Lord Justice STIRLING gave judgment on the same lines as Lord Justice Romer. He said that, speaking for himself, he was not prepared to say that every one of the exceptions mentioned in section 12 of the Act of 1863 would, but for that section, have been included in the words "domestic purposes" within the meaning of section 53 of the Act of 1847. He was not prepared to hold that, if an owner or occupier of a house erected a swimming-bath simply for the use of himself, this would not be a domestic purpose; he should require time for further consideration. But this case differed considerably from that; the bath being, in his view, a portion of the school equipment. The appeal must therefore be allowed, with costs.

It was understood that the defendants should pay for the water since 1899 at the rate of 6d. per 1000 gallons.

The Sowerby Bridge Urban District Council have placed the contract with Messrs. R. Dempster and Sons, Limited, of Elland, for the superstructure, stage floor, and roof to be erected over the existing purifiers.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Saturday, July 26.

(*Before Mr. Justice* LAWRANCE.)

Ilford Gas Company v. Ilford Urban District Council and Jackson (Third Party)—The Damage to Gas-Mains.

This case came on for further hearing with regard to the third-party proceedings.

Mr. C. A. RUSSELL, K.C., and Mr. WHATELEY appeared for the District Council; Mr. DUKE, K.C., and Mr. MACKENZIE represented Mr. Jackson.

Mr. RUSSELL said the questions to be considered were those between the District Council and Mr. Jackson, the Contractor employed by them under a contract of Feb. 26, 1901, to lay sewers in the road close to Green Lanes, Ilford. The original action was brought by the Ilford Gas Company against the Council, alleging that, in the construction of the sewers, damage was done to certain gas-mains, and claiming damages therefor, and also for loss of gas.* This action being brought, the Council made use of the third-party proceedings to bring in Mr. Jackson, the Contractor, alleging that the terms of the contract bound him to indemnify the Council against all liability to the Company. Mr. Jackson contracted to make the sewers in question, and, proceeding with the work, found that the line passed under certain gas-mains. There was a consultation between himself and the Council's Engineer; and it was agreed that the best way of supporting the mains was by erecting some brick piers—the Engineer agreeing that this was to be regarded as an "extra." Subsequently the mains were crossed again and again; and the same procedure was adopted by the Contractor without special instructions from the Council's Engineer. It was found shortly afterwards that damage was done by subsidence, and a quantity of gas was lost. In the action, the Jury returned a verdict against the District Council, assessing the damage at £200. Mr. Duke, who appeared for the third party, induced his Lordship to leave the question of negligence to the Jury; and they found there was no negligence due to Mr. Jackson.

Justice LAWRANCE thought the best way would be to deal with the case of the third party anew, and disregard the rider of the Jury.

Mr. RUSSELL said on the occasion referred to he had at once given notice for a new trial; alleging that the finding of the Jury was one they had no right to make.

Justice LAWRANCE understood Mr. Jackson said he did not care whether the defendants were guilty of negligence or not. What was complained of was something he was ordered to do by the Council.

Mr. RUSSELL said that was so. Mr. Jackson denied that he had been guilty of negligence, as he securely packed the soil round the mains, and properly secured them in the manner directed by the Engineer, and to his satisfaction. But against this, he (Counsel) had to adduce the agreement, which provided that the Contractor should save the District Council harmless, and indemnify them for all claims and actions for, and in respect of, any damage or injury to persons or property arising from, or occasioned by, the neglect, default, or misconduct of the Contractor, or any person employed by him, or by execution of the works. He submitted that this was the plainest possible bargain between the parties that, whatever damage or injury was done to persons or property by the carrying out of the works, the Contractor was to be the person ultimately responsible, even without any negligence on his part. He (Counsel) would prove the few facts that were necessary; but he submitted that the matter was absolutely disposed of by the terms of the contract.

Mr. *Taylor*, engineer, said his firm prepared the tenders, specifications, contract, &c., which were signed by Mr. Jackson. The work was done in the way that was absolutely the best—viz., by supporting the gas mains with brick pillars. He thought the cause of the subsidence was that the material placed in the trench had not been sufficiently rammed. Hard core was never put in unless the soil was boggy and peaty. If the trenches had been properly rammed, the work would have been good at the present day.

Mr. DUKE submitted that if he cross-examined the witness he ought not to be held to have waived his right to rely on the verdict of the Jury in his client's favour.

Justice LAWRANCE said he intended that by saying they would look at the case anew for the purposes of the present proceedings.

Cross-examined by Mr. DUKE: He thought the work was very well done by the Contractor, and his opinion as to the reason of the subsidence was based on what had occurred. He admitted that soil must subside, however well it was rammed. Originally the line of the sewer was laid out on one side of the road, and the District Council, for traffic reasons, changed it to the other, where it was laid.

Mr. *Hetherington* agreed with the evidence of the last witness, and said, in cross-examination, that no complaint was ever made while the work was progressing. He only thought the ramming must have been insufficient because of what had happened since.

Mr. *Strachan* said he had known a case where gas-mains had been broken by a steam-roller going over the trenches before they were set.

Mr. *Jackson* said he saw the filling of the trenches where the brick piers were, and the work was well and thoroughly done.

Cross-examined: He was not always on the spot, but he saw a great deal of the work. The place where the damage was done was in the middle of the road, where the heavy traffic passed.

Mr. *H. Jackson*, who superintended the work of the contract, said that when the question of putting piers was mooted, the Council's Engineer gave the order, and witness was not consulted.

Cross-examined: There was always a risk of subsidence, however well the work was done.

Other evidence having been given,

Mr. DUKE summed up the case for the Contractor.

Mr. WHATELEY having replied on behalf of the Council,

Justice LAWRANCE reserved judgment.

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*See JOURNAL, Vol. LXXIX., p. 1581.

Employing Corporation Workmen.

At the Durham Summer Assizes, Mr. Justice Bruce and a Jury had before them recently an action for libel brought by Mr. T. B. Watson, a member of the Stockton-on-Tees Corporation, against Mr. G. S. Ordith, a burgess of the town. The parties were both candidates for the representation of the same ward at the last municipal elections; and in the bills with which the place was placarded, the defendant accused the plaintiff of using his position as a member of the Gas Committee of the Corporation for his own personal advantage. The specific charges brought against him were that he had indirectly, through his son, bought old gas-meter drums from the Corporation, and had also employed the Corporation workmen for his own purposes. The defendant admitted the publication of the statements complained of, but urged that they were true in substance and in fact, and moreover were fair comments on matters of public interest. The transaction in regard to the meter-drums was not thought by the Judge to bear very materially upon the libel; but in regard to the workmen, it was explained that the Gas Committee had, when work was slack, sanctioned their engagement by private persons. Mr. Watson said he had made use of them under such conditions, and had paid well for their services, as well as for everything he had had. The Committee decided, however, that the practice should be discontinued; and the Gas Engineer (Mr. W. Ford) had received instructions to this effect. At the close of a hearing extending over two days, his Lordship pointed out to the Jury that, while very great latitude was allowed in this country in the discussion of matters of public interest, there must be no imputation of improper conduct, unless the critic could prove that it actually existed. They would consequently have to be of opinion not only that the criticism was honest, but that it was well founded. The Jury returned a verdict for the plaintiff—damages £175.

Damage to Gas-Pipes by Sewerage Operations.

At the Belfast Assizes, on Monday last week, Mr. Justice Wright and a Jury had before them an action in which the Carrickfergus Gas Company, Limited, were plaintiffs, and Mr. W. M'Larnon, a Contractor employed by the Carrickfergus District Council, was defendant. The plaintiffs were owners of the gas-pipes in the town, and they complained that the defendant so negligently and unskilfully carried out the sewerage and drainage works that certain of the pipes were broken, and some gas escaped. A sum of £20 3s. 6d. was claimed as damages and costs. The defendant denied that he did any of the acts complained of, or that it was owing to any negligence or want of skill on his part that the pipes were broken. He further stated that he satisfied the plaintiffs' claims for damages for matters in respect of which the action was brought by the payment of £31 5s. 7d., which sum the plaintiffs agreed to accept in full discharge of all damages. The Jury answered the questions put by his Lordship as follows: (1) Were the gas-pipes broken and injured by reason of the negligence of the defendant or his workmen in constructing the sewerage works?—Yes. (2) If so, what damages were sustained by the plaintiffs in consequence thereof?—£5. His Lordship accordingly gave judgment for this amount.

Claim against a Trustee in Bankruptcy.

An application was recently made to Deemster King, by the Trustee of Alfred Kneen's bankruptcy, for authority to pay the Douglas (Isle of Man) Gas Company their claim in full, under a threat from the Company to cut off the gas unless they were paid. Under their Special Act, the Company are not bound to supply anyone. The Deemster thought the Company should reconsider their position. He did not think they ought to refuse a supply in such a case; and if the law allowed it, it should be altered. He left the matter over for the Trustee and the Company to enter into a formal agreement, as he did not feel inclined to give his approval on an informal application. The matter came before him again on Monday last week, when he said he thought the claim should not be pressed; and he advised the Trustee to use oil-lamps till the premises had been disposed of.

Theft from a Prepayment Meter.

At the West Ham Police Court last Friday, William Newell, 21, a baker, of Elphick Street, Canning Town, was charged with stealing 3s. 6d. and a padlock, the property of the Gaslight and Coke Company. Prisoner used to lodge at No. 22 in the street named, where there is a prepayment gas-meter supplied by the Company. On the morning of the 19th inst., a Miss Russell, employed at the house, dropped a penny in the slot, and then noticed that the lock of the money-box was intact. Prisoner was about the place from eight till half-past three o'clock, and after that left the house and did not return. In the evening, the lock of the box had gone, and an examination of the meter by the Company's man showed that 3s. 6d. was missing. In the kitchen was a bent poker, and when last Thursday night prisoner gave himself up, he said he had used the poker for breaking open the meter. He took about 3s. 6d., and threw the lock away. He pleaded guilty, and said he had been out of work for a long time. He had been previously convicted; and was now sent to gaol for one month with hard labour.

The Langport, Huish, and Curry Rivel Gas Company, Limited, were so satisfied with the energetic efforts of the lady interviewer of the Richmond Gas Stove and Meter Company, Limited, who has been engaged for the past few weeks in persuading the ladies of the locality to hire gas cookers on their behalf, that on the work being concluded they presented her with a handsome gold brooch in recognition of her services.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY.

Half-Yearly Report and Accounts.

The following is the report on the working of the Company in the six months ended June 30, which, with the accounts for this period, will be submitted to the proprietors on Friday:—

The accounts for the past half year show that, after providing for the fixed charges, there remains a balance, including the amount brought forward, available for distribution, of £373,029 8s. 1d., out of which the Directors recommend a dividend on the ordinary stock at the rate of 4 per cent. per annum; carrying forward the sum of £68,165 8s. 1d. to the credit of the current half year.

This result of the working for the half year is disappointing, especially considering the economies which have been effected in several items of expenditure; but the explanation is to be found in the one item of gas sold, which shows that, notwithstanding a reduction in the price of 5d. per 1000 cubic feet, equal to a saving to the consumers of £400,000 a year, there has been an actual reduction in the quantity of gas sold of 82 million cubic feet, or ¾ per cent.

It will be of interest to trace the cause of this loss of business. In the three winter months of the half year, the weather was exceptionally mild, and there was a reduction in the gas sales of 296,715,000 cubic feet, or 4·3 per cent. In the three summer months, the temperature was abnormally low, and there was an increase in the sales of gas of 213,915,000 cubic feet, or 5·4 per cent. This is another instance showing how directly the results of a gas company's working are affected by variations in temperature in these days, when an increasingly large proportion of consumers depend upon gas-stoves for heating purposes. This consideration largely influenced the Directors in arriving at their decision to recommend to the proprietors the distribution of a dividend for the past half year at the rate of 4 per cent. only.

Had the reduction in the price of gas in January last been limited to 4d. per 1000 cubic feet—that is, from 3s. 5d. to 3s. 1d.—the amount available for dividend would have been sufficient for a distribution at the full statutory rate of £4 16s. per cent. The Directors, however, believe that the policy of foregoing the exercise of the Company's full rights under the sliding-scale clauses on this exceptional occasion will have the approval of the proprietors.

The Directors are able to report that the contracts they have entered into for the supply of coal and oil for the current twelve months are on terms slightly more favourable to the Company than last year.

The only other matter calling for special notice is the sale of the site of the Company's Pimlico works. The amount which was realized for this property has been placed to the credit of the capital expenditure account.

The Court of Directors has been furnished by the several Engineers of the Manufacturing and Distribution Departments respectively with the usual certificates that all the Company's plant has been maintained in thorough efficiency.

The accounts accompanying the report consist of the usual statements, from which we extract the following particulars:—

The statement of capital (stock) on June 30 last sets forth that the total paid up is £9,466,500; added on conversion, £12,176,563—total amount authorized, £21,643,065. The statement of loan capital stands thus: Total paid up, £2,844,000; added on conversion, £1,479,975—total amount authorized, £4,323,975.

The capital account shows receipts (with premiums, £1,586,807) to the amount of £27,553,847 11s. 9d. The expenditure is shown in the following items:—

Expenditure to Dec. 31, 1901			£13,049,815 1 2
Expenditure during the half year to June 30, 1902—viz.,			
Buildings and machinery in extension of works	£12,608 10 8		
New and additional mains and service-pipes	12,129 19 9		
Do. do. meters	12,475 18 9		
Do. do. stoves	12,616 18 10		
		49,831	0
		£13,099,646	9 2
Net sale of surplus land	£34,929 17 11		
Sale and depreciation of plant	23,290 4 1		
		£108,220	2 0
Total expenditure		£12,991,426	7 2
Nominal amount added on conversion		13,656,540	0 0
Balance of capital account		905,881	4 7
		£27,553,847	11 9

The balance available for division is £373,029 8s. 1d.; and the statement showing how the Directors propose to appropriate it is as follows:—

June, 1901.			
£221,570	.. Net balance brought from last account	£64,834	12 5
208,181	.. Net revenue for the half year	308,194	15 8
£429,751		£373,029	8 1
(£4 8s. per cent.)	A dividend on the ordinary stock—		
£331,757	£4 per cent. per annum on £15,243,200	304,864	0 0
£97,994	.. Balance carried to next account	£68,165	8 1

The three statements relating to the reserve, insurance, and depreciation funds show that the balances on June 30 were as follows: Reserve

fund, £54,915; insurance fund, £88,683; and depreciation fund, £60,637. The insurance fund had to bear in the past half year a sum of £237 4s. 9d., the value of plant destroyed by fires in the Company's district.

The following is the revenue account :—

Receipts.

June Half Year, 1901.		£ s. d.	£ s. d.
	Sale of gas—		
£1,736,196	Common gas, per meter, at 3s. and 2s. 5d. per 1000 cubic feet	1,517,566 14 0	
	Public lighting and under contracts—		
85,770	Common gas	76,020 11 2	
			1,593,587 5 2
£1,821,966			
25,847	Rental of stoves	..	27,484 19 9
	Residual products—		
£408,617	Coke, less £43,769 9s. 2d. for labour, &c.	263,714 19 1	
13,171	Breeze, less £2928 14s. 2d. for ditto	12,826 13 4	
66,462	Tar and tar products	54,699 15 9	
68,563	Ammoniacal liquor and sulphate of ammonia	84,093 17 7	
			415,335 5 9
£556,813			
£4,783	Rents receivable		4,703 16 7
237	Transfer fees		286 15 0
£2,409,646			2,041,398 2 3

Expenditure.

June Half Year, 1901.		£ s. d.	£ s. d.
	Manufacture—		
£1,159,913	Coals, including oil, dues, carriage, unloading, and trimming	744,068 10 6	
14,848	Salaries of engineers and other officers at works	15,057 0 4	
162,917	Wages, gas making £139,624 10s. 3d.	156,988 0 0	
16,993	,, sundries £17,363 9s. 9d.		
55,049	Purification, including £19,436 15s. 8d. for labour	52,529 7 6	
221,675	Repair and maintenance of works and plant, materials and labour, less received for old materials, £6014 14s. 9d	179,923 13 0	
			1,148,566 11 4
	Distribution—		
35,745	Salaries and wages of officers (including Rental Clerks)	34,250 13 0	
33,466	Repair and maintenance of mains and service-pipes	36,698 4 4	
24,406	Repair and renewals of meters	33,545 7 8	
26,300	Stove fixing, repairs, and renewals	28,791 14 6	
15,496	Gas fittings (automatic meter supplies)	17,648 8 6	
			150,934 8 0
17,014	Public lamps—Lighting and repairing	..	16,901 14 8
	Rents, rates, and taxes—		
6,246	Rents payable	6,227 2 2	
133,859	Rates and taxes	140,786 14 9	
			147,013 16 11
	Management—		
2,750	Directors' allowance	2,750 0 0	
223	Company's Auditors and Assistant	223 2 0	
11,359	Salaries of Secretary, Accountant, and Clerks	11,477 4 4	
21,193	Collectors' commission	22,062 19 5	
6,937	Stationery and printing	7,305 18 9	
3,568	General charges	2,970 17 7	
			46,790 2 1
873	Parliamentary charges	..	748 17 6
922	Law charges	..	1,238 2 2
680	Charges *re* quinquennial re-valuations	..	..
5,263	Bad debts	..	5,120 18 4
500	Depreciation fund for Works on Leasehold Lands	..	500 0 0
14,654	Annuities	..	15,584 7 10
1,007	Workmen's compensation account	..	1,126 4 8
	Public officers—		
1,236	Gas Referees and Official Auditor	1,257 17 9	
850	Public testing-stations	692 5 5	
			1,950 3 2
£1,995,942			1,536,475 6 8
413,704	Balance carried to net revenue account		504,922 15 7
£2,409,646			2,041,398 2 3

The net revenue account stands as follows :—

June Half Year, 1901.		£ s. d.	£ s. d.
£551,753	Balance from last account	398,988 5 11	
330,183	Less dividend on the ordinary stock for the half year to Dec 31, 1901	334,153 13 6	
			64,834 12 5
£221,570			
413,704	Revenue account	..	504,922 15 7
£635,274			£569,757 8 0

June Half Year, 1901.		£ s. d.	£ s. d.
	Interest on debenture stock and bonds,		
£67,451	accrued to June 30, 1902	..	69,409 12 6
75,999	Dividend on the preference stocks	75,997 19 0	
45,500	Dividend on the 3½ per cent. maximum stock	45,500 0 0	
			121,497 19 0
16,573	Interest on temporary loans and sundry funds	..	5,820 8 5
429,751	Balance applicable to dividend on the ordinary stock	..	373,029 8 1
£635,274			£569,757 8 0

The statements furnishing particulars as to working are as follows :—

Statement of Coal Used, &c.

Description of Coal.	In Store Dec. 31, 1901.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store June 30, 1902.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	227,923	826,951	919,541	2,309	133,024
Cannel	16,360	6,494	*7,358	20	15,476
Total	244,283	833,445	926,899	2,329	148,500

* In addition to this quantity of cannel, 6,756,423 gallons of oil and spirit were used during the half year.

Statement of Residual Products.

Description.	In Store Dec. 31, 1901.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1902.
Coke—tons	48,642	573,465	123,241	485,167	12,699
Breeze—tons	2,785	75,587	14,253	62,569	1,550
Tar—gallons	946,418	9,369,116	9,554 805	13,182	747,547
Ammoniacal liquor—butts	21,669	251,527	260,804	..	12,392

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts. (Estimated.)	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
* 11,539,950	505,062	10,209,008	10,878,563	49,263
† 11,607,710	522,715	10,274,155	10,954,321	51,048

* Including 2,144,026,000 cubic feet of "oil gas." † June half year, 1901.

The last statement is the general balance sheet. It shows that the value of the stores on hand on June 30 last was as follows: Coals, £113,096; oil and petroleum spirit, £57,459; coke, £6700; tar and ammoniacal liquor and products, £76,779; sundries, £235,633—total, £489,667. The figures for the corresponding period of 1901 were: Coals, £218,808; oil and spirit, £138,136; coke, £54,795; tar, &c., £100,570; sundries, £274,278—total, £786,587. The item "automatic meter supplies (balance of fittings account)" amounts to £134,147, as compared with £195,945 at the close of the six months ending June 30, 1901.

THE LONDON COUNTY COUNCIL AND WATER GAS.

The Chemist's Report.

In the report published last week (p. 220) of the Public Control Committee of the London County Council on the subject of water gas in the gas supplied to the Metropolis, it was mentioned that the matter had been made the subject of a special investigation by the Chemist (Dr. Frank Clowes), whose report had been distributed to the members of the Council. We have received a copy of the document, of which the following are the principal features.

Dr. Clowes begins by stating that, in accordance with the authority of the Council, the gas supplied to London by the South Metropolitan, Gaslight and Coke, and Commercial Gas Companies has been continuously examined during the past twelve months, with a view to ascertaining the quantity of water gas present. He then reminds the Committee that the Council on July 30, 1901, authorized a communication to be sent to the President of the Board of Trade, asking that the Government might be urged to take steps to promote legislation in the next session of Parliament to give effect to the recommendations of the Departmental Committee on Water Gas. This Committee suggested *(inter alia)* that the proportion of carbonic oxide in the public gas supply at night should be limited to 12 per cent., or such greater amount as a central department might consider desirable, and that provision should be made for testing the gas for carbonic oxide. A reply was received from the Board of Trade in November, 1901, stating that the President would be prepared, if opportunity offered, to introduce a Bill to give some authority power to make the necessary regulations with regard to the supply of water gas. He goes on to state that the danger connected with the introduction of water gas into illuminating gas arises from the fact that "water gas contains from 40 to 50 per cent. by volume of poisonous carbonic oxide gas, and that although coal gas itself contains about 6 per cent. of carbonic oxide, its poisonous nature may be very largely increased by the addition of water gas in unduly large proportion." He thinks it may be considered desirable "that the whole amount of carbonic oxide in coal gas should not exceed 14 per cent. by volume."

With regard to the gas supplied by the South Metropolitan Company, although on a considerable number of days more carbonic oxide was present in the gas than is usually found in well-made coal gas, there was nothing to indicate the presence of water gas.

During the twelve months, 308 samples of the gas supplied by the Gaslight and Coke Company were examined. These were collected from all parts of the district now supplied by the Company, and a

considerable number of them were taken during lighting hours. The results of their examination, together with the date and place of collection, are set out in the first of the tables appended to the report; the first of the two columns of figures showing the percentage volume of carbonic oxide present, and the second the quantity of water gas in the mixed gases, calculated on the basis that well-made coal gas contains 6 per cent. and water gas 40 per cent. of carbonic oxide. The largest quantity of water gas present on any one day in the gas supplied by the Company was over 34 per cent., which would be equal to about 50 per cent. of carburetted water gas of average illuminating power. On several days during the year the gas supplied by the Company to at least some portion of their district contained practically no water gas.

Dr. Clowes then proceeds to remark that various suggestions have been made as to the maximum quantity of water gas which should be permissible in the gas supplied to consumers for lighting and other purposes. The one received most favourably is that of basing the allowable quantity of water gas on the carbonic oxide present in the gas as it is supplied to consumers; and the limiting quantity of carbonic oxide as proposed by different individuals varies from 12 to 20 per cent. by volume. The following is a classification of the percentages of carbonic oxide actually found in the gas supplied by the Gaslight and Coke Company during the present inquiry:—

Below 10 per cent.,	75	times, or in	24	per cent.	of the	samples.
,, 12	,,	176	,,	57	,,	,,
,, 16	,,	289	,,	94	,,	,,

So that of the 303 examinations made, "on 283 occasions the carbonic oxide present was below 16 per cent., on 176 of which it was below 12 per cent., and in 7 per cent. of the samples only was the percentage above 16. The highest quantity found on any one day during the year in the gas supplied by this Company was 17·7 per cent." On a number of days two samples were collected from the same place—one during the day and another during the night—in order to ascertain whether there was any marked difference in the quantity of carbonic oxide present before and during lighting hours. Tabulated results show that, with a few exceptions, there is very little difference between the quantity of carbonic oxide present in the day and in the night sample.

In the second table appended to the report, the results of the examination of the gas supplied by the Commercial Gas Company during the year are set out in the same manner as those of the Gaslight and Coke Company. Between June 1, 1901, and May 17, 1902, 288 samples of the gas supplied by the former Company were collected and examined. They included both day and night samples, and were taken in various parts of the Company's district. The percentages of carbonic oxide found are classified as follows:—

Below 10 per cent.,	24	times, or in	8	per cent.	of the	samples.
12	,,	56	,,	19	,,	,,
16	,,	220	,,	76	,,	,,

The carbonic oxide present in the remaining 24 per cent. of the samples varied between 16 and 24·7 per cent. The maximum amount here stated represents about 70 per cent. of carburetted water gas. With respect to the samples taken before and during lighting hours, the quantity of carbonic oxide varied considerably. The night samples occasionally contained less, but generally more, than the day samples; the quantity present at night on several occasions being from two to three times as much as that present in the samples collected in the daytime.

The total number of samples collected in the districts supplied by the three Companies during the year was 838, exclusive of samples taken in duplicate for checking the examination. For the purpose of readily showing the variations in the quantity of water gas present from day to day in the gas supplied by the two Companies making use of it, Dr. Clowes has attached to his report a diagram which indicates by vertical lines the actual percentage present on each day during the period of examination.

Dr. Clowes summarizes under four heads the information obtained by the daily examination of the gas supply*, and concludes his report as follows: "The information obtained from an examination extending over a year proves that the Gas Companies are able to supply gas of the statutory illuminating power, even when the quantity of carbonic oxide in their gas does not exceed 12 per cent. I recommend, therefore, that if any of the Gas Companies which are supplying gas to London are using water gas, when the Board of Trade introduces a measure limiting the extent of enrichment of coal gas by means of carburetted water gas, this Committee should seek to have inserted in the Bill a clause stating that the whole amount of carbonic oxide present in the gas, as it is supplied to London, shall not exceed, at any time during the twenty-four hours, 14 per cent. by volume.

The Committee's report duly came before the Council at their meeting last Tuesday, and the recommendation at the close thereof—to the effect that a copy of the Chemist's report should be forwarded to the President of the Board of Trade, and that he should be urged to give effect to the promise contained in his letter of Nov. 21, 1901, and promote legislation in the session of 1903—was agreed to.

The Sheppey Water and Lighting Company, Limited, has been registered with a capital of £12,000, in £1 shares, to supply the island of, and especially the parishes of, Minster and Eastchurch, Sheppey, or other places in Kent, with water, electric light, and electricity.

Last Friday night, a fire broke out on the premises of Messrs. Graham, Morton and Co., Limited, of Hunslet, Leeds. On the arrival of the City Fire Brigade, the roofs of two of the departments were found to be ablaze; but after half-an-hour's persistent work the outbreak was got under. The property is insured.

* His conclusions were given in the Committee's report, published in the "JOURNAL" last week.—Ed. J. G. L.

MEETING OF THE WELSBACH COMPANY.

Last Tuesday was the day appointed for the annual meeting of the Welsbach Incandescent Gas-Light Company; and the shareholders naturally turned up in force to learn what they could of the prospects of the undertaking under the new management which has lately been inaugurated. The feeling of the meeting was, however, on this occasion all one way; there being nothing whatever to disturb the cordiality of the proprietors towards the new Board. The Directors, on making their appearance in the Great Hall at Winchester House, were greeted with prolonged applause, which was frequently repeated during the delivery of the excellent speech of the Chairman of the Company (Mr. Edgar Williamson). This speech was in every respect worthy of the reception it received; and it proved that the shareholders are amply justified in their confident belief that those now at the head of affairs are bent upon doing their very best to drag the undertaking out of the serious difficulties in which it has become involved.

An Explanation by the Chairman.

The notice of meeting having been read by the Secretary (Mr. W. Resbury Few), the Chairman, whose rising was the signal for a second outburst of applause, proceeded to explain why it was that he was occupying the chair that day. At the last meeting of the Company—that which was called to receive the report of the Advisory Committee—the Chairman of the Committee stated that no member of it aspired to supplant the Directors in their then position; and he might have added that no member of the Committee could be induced to join the Board, by reason of the many engagements each of them had—for that was the truth. The members of the Committee were called upon to act as Directors, and retire in turn as permanent Directors were appointed. When his (the Chairman's) turn for retirement came, it was pointed out to him that he might be prejudicing the interests of the shareholders by retiring at that juncture, as he was the last member of the Committee acting as a Director. It was further pointed out to him that his retirement might bear the interpretation that he feared to meet the shareholders and take the responsibility for the important changes in policy that had been effected. "I need not," said Mr. Williamson, "tell those of you who know me, that that reason appealed to me at once." As a consequence, he appeared before them that day to accept his full share of the responsibility; and he intimated that, if it was their desire, he would be willing to continue to hold his position, at any rate until the end of the current financial year.

The Onerous Mantle Cotton Contract.

Presuming that the shareholders would wish to know what the Directors had done in pursuance of the recommendations of the Advisory Committee, the Chairman next directed his attention to rendering an account of their stewardship. He prefaced his remarks by stating that it was his desire, and the desire of all his colleagues, that the proprietors should have the fullest possible information as to the position of affairs—information that would enable them to form their own independent judgment as to the wisdom of the important steps that the Board had considered it advisable to take in their interests, as well as with regard to the future prospects of the Company. This would relieve the Directors of the need for prophecying, which was always a thankless task. In the facts he was about to lay before them, he did not propose to separate the acts of the Advisory Committee from those of the definitive Board, as the one policy was simply the continuation of the other. One of the first matters, he said, to which the Directors addressed themselves was an endeavour to modify the onerous contract for mantle cottons of which the Chairman of the Advisory Committee had given them particulars—a contract which bound the Company hand and foot for four years, at prices considerably in excess of those ruling in the open market. Under this contract, there was a loss of something like £12,000; and therefore the proprietors would no doubt be pleased to hear that they had succeeded in modifying the terms—first of all by reducing the quantity one-half, and then by lowering the price to be paid by some 10 per cent. This would effect a saving of about £8000. But, said the Chairman, encouraging as this was, he was sorry he could not yet call the contract an entirely satisfactory one. He, however, hoped that the manufacturer, who had met them very fairly in the past, would still further meet them in the future, and so open up extended business relations with the Company.

The Kern Burner Company.

The Chairman next referred to the affairs of the Kern Burner Company, Limited, which, he pointed out, had a capital of £200,000, divided into £100,000 of preference and £100,000 of ordinary shares. There was also a debenture debt of £115,000. The Welsbach Company held £15,000 of these debentures (the remainder, in addition to the preference shares, going to the vendors), which were allotted to them in exchange for cash advances; and they also held the so-called ordinary shares, which might be properly described as "doubly deferred shares," inasmuch as there was no prospect of their ever receiving a dividend. The Kern Burner Company must not, of course, remarked the Chairman, be confused with the Kern burner British patents, for which the Welsbach Company paid £80,000. The Kern Burner Company owned the foreign patents; and this Company had cost the Welsbach Company, during the past two-and-three-quarter years, no less a sum than £27,137, or at the rate of about £10,000 a year. The Company were in arrear with their debenture interest and preference dividend; and, in fact, the liabilities far exceeded the assets. Added to this, said the Chairman, the Managing-Director of the Company stated that, before he could put the undertaking into a position to earn its expenses, he would require a further sum of from £20,000 to £25,000. In short, the position disclosed was one of hopeless insolvency; and it would not cause surprise, therefore, when he stated that the Welsbach Board determined to stop supplies—they had been

in the habit of furnishing the Kern Burner Company with such cash as they might require for wages, salaries, and other expenses. More especially was this desirable, in view of the fact that, in the event of the Kern Burner Company going into liquidation, one of the assets, and one which he (the Chairman) regarded as of great value—namely, the rights in the Clamond Radiator Stove in Great Britain—reverted to the Welsbach Company. Well, to cut a long story short, a proposal was made by the Kern Burner Company to the Welsbach Company, and was accepted by them. The net result of the transaction to the latter Company was the stoppage of a loss of £10,000 a year, the retrieval of the Clamond stove British patent, and the absolute ownership of the Colonial patents, from which they might hope to derive some little income. The meeting expressed approval of the Board's negotiations in this matter in a very hearty manner; and the Chairman then proceeded to deal with

THE QUESTION OF MANAGEMENT.

After considering the qualifications of a large number of applicants, he said, the Board finally decided to appoint Mr. K. H. Buchanan, who had been in the employ of the Company for a number of years, to the position of General Manager, and Mr. L. Fletcher, the late General Manager of the Sunlight Company, to the office of Assistant-General Manager. These two appointments, they had every reason to believe, would give satisfaction, not only to the shareholders, but to the trade generally. There was, however, also other very necessary reorganization work which had to be undertaken—for instance, there was the closing of unproductive departments, and departments that were carried on at a positive loss. Among those which perhaps were not carried on at an absolute loss, but from which they certainly derived no profit, was the

MAINTENANCE DEPARTMENT,

the object of which was to supply burners and mantles to customers and to maintain them. This department they had arranged to transfer to certain leading gas companies, who took over the whole staff. Among these Companies were the Gaslight and Coke, the South Metropolitan, and the Commercial Gas Companies. All the benefit derived from this department by the Welsbach Company was that it gave them the sale of a certain number of burners and mantles; and the Board believed that by the new arrangement they would keep the trade and save the fixed expenses, which amounted to nearly £4000 a year. It was necessary also to reduce the number of workpeople generally; there were far too many employees in the business. "In this connection," said the Chairman, "we have had, I am very sorry to say, to dispose of the services of some old servants; but until the proprietors get some return for their money, we cannot afford, from benevolent or other motives, to retain the services of people we consider quite unnecessary in the business. The total reduction we have made in wages and salaries amounts to a little over £13,000 a year—and that without in any way, I believe, impairing the efficiency of the staff. Indeed, the trade figures—which are the best test after all—show that there has been a considerable increase in trade, notwithstanding this large reduction in fixed expenses." The Chairman next referred to the Company's branches. The shareholders would, he said, remember that they had a number of branches—a number of shops in various parts of London and the country. These were carried on in direct opposition to many of the best customers of the Company, and they were further carried on at a very considerable loss, which was estimated at between £7500 and £10,000 a year. Well, they closed these branches, and substituted depôts at four important centres; and so far this arrangement was working very satisfactorily. The figures of trade done at the four depôts exceeded those of the trade done at the whole of the eighteen branches for the period from April 1 to July 13—the latest date to which they were brought. The sales of mantles, indeed, showed a phenomenal increase in the depôts as compared with the sales formerly made in the branches. This, said the Chairman, brought them to the question of the

POLICY OF THE COMPANY,

which was perhaps the most important matter with which he had that day to deal. The policy of the old Board appeared to be a policy of war, and no compromise. Now, he remarked, however glorious a policy of legal warfare might be, it was not usually profitable—at least to the litigant. In their last published report, remarked the Chairman, the Board said: "The Directors greatly regret the extensive legal operations against infringers, rendered necessary by the deplorable inadequacy of the law to deal with such a case as theirs." The Advisory Committee, however, stated that: "The benefit to the Company has not been commensurate with the large expenditure; and the goodwill of the Company can be better upheld, and in the opinion of the Committee ought to have been upheld, by a vigorous commercial policy rather than by endless procedure in the Law Courts." The Chairman said he assumed that the first extract he had read was intended by the Directors to give the shareholders notice that they were involved in a sea of litigation which might at any moment overwhelm them; otherwise he could not explain the fact that when he took office there were no less than

SIXTEEN HUNDRED LAWSUITS

of various kinds and in various stages; and in addition there were 500 or 600 more writs ready to be issued. Had the new Board continued this policy, added the Chairman, they must have devoted themselves entirely to the prosecution of these lawsuits, instead of to the development of the business. Among these actions the most important, perhaps, were two against manufacturers of mantles. Taken by themselves, they might not have been of much account; but the actual position was a very serious one. The Board found that some forty corporations owning gas-works and gas companies had formed an Association, and had subscribed £20,000, with the object, to use their own words, "of breaking down the Welsbach monopoly." That was to say, the Welsbach Company were actually fighting what should have been their very best business friends and customers. The condition of affairs was thus a very serious one. There was more than a probability that, had the corporations and gas companies lost the case in the first instance, they would have gone to the Court of Appeal, and if necessary to the House of Lords; and there was the absolute certainty that, if the unexpected had happened, and the Welsbach Company had lost in the first instance, they must have gone to the Court of Appeal and the House of Lords. This would have meant two years of costly litigation, trade disturbance, and indefinite position, during which they could not have checked infringers and would have been unable to pay any dividend. "And," said the Chairman, "suppose we had emerged from this two years' trial with any feathers to fly with, our patent would have had only another two-and-a-half years of life; and it would have been impossible to hope in this period to recoup our loss." Under these circumstances, he remarked, the shareholders would not be surprised that the Board resolved, before going into action, to try whether it was not possible to settle the whole question on broad business lines that would give them at once the position they could hope to hold at the end of the two years' fight, and would convert the important undertakings with whom they were at war into friends and supporters. They therefore approached these bodies, whose case was most admirably

CHAMPIONED BY SIR GEORGE LIVESEY.

Sir George met the Board, as all who knew him would expect, in a straightforward, businesslike way. They then learnt something that they did not realize before, and that was that the important gas undertakings of this country were convinced of the necessity for introducing incandescent lighting in their respective districts, and had resolved to introduce it; but that they felt they could not trust their very great interests in the hands of the Welsbach Company, who had treated them so badly in the past. It was, remarked the Chairman, a little shocking to discover that they could not be trusted; but unfortunately the present administration had to suffer for the sins of their predecessors. At first sight, it might seem that the gas companies took an extreme view; but an instance which appeared to afford justification for their fears had come to the notice of the Board. The Welsbach Company had entered into an agreement with one of their customers for the supply of mantles, burners, and accessories. The prices were agreed; and the term was for five years. The buyer had undertaken to accept delivery of a certain minimum quantity of goods for each of the five years; and one would have thought that it would have been to the interests of all parties for this minimum to have been largely exceeded. The customer vigorously pushed the sales, and sent in a number of orders to the Company; but the Directors put their backs to the wall, and refused to make any further deliveries, on the ground that the buyer had had his minimum quantity, and was not entitled to any more. The mirth evoked by this extraordinary story having subsided, the Chairman remarked that it was

IMPOSSIBLE TO CONDUCT BUSINESS ON THESE LINES.

How was the man to regulate his trade? The customer, however, came forward and made a very reasonable business offer. He said he was prepared to manufacture these mantles, and pay a royalty on every one so made. He did not know why it did not suit the Company to deliver; but if it did not, he said he would make the mantles himself and pay a royalty. "You would hardly believe it," continued the Chairman, "but your Directors refused this offer, and were actually going to the Courts—Counsel had been briefed—for a legal definition of the word 'minimum,' which they contended meant 'maximum.'" He need not tell them how the new Board dealt with this case; but it served to explain the fear the gas companies very properly had of the treatment they might receive at the hands of the Welsbach Company. After a considerable number of interviews, the Directors had settled this question of the gas companies and the two actions, on the lines that the two defendants and the gas companies acknowledged the validity of the Welsbach patents, and took from them licences (in the case of manufacturers) to make mantles—paying a royalty on all that were so manufactured. The agreement with the gas undertakings was slightly different. They were in a position to buy from the licensees or from the Welsbach Company without paying any royalty; but if they could not purchase in this way on advantageous terms, they had the option of manufacturing or importing on the payment to the Company of a royalty. He (the Chairman) thought they had thus attained the only position they could have hoped to attain at the end of the two years' fight; for if they were to attach any importance to the statements made, they could not have hoped in the early future to have supplied the requirements of Great Britain for mantles, and so at the end of that time they would any way have been compelled to grant licences. They had thus anticipated the position by two years; and for the policy of war and no compromise, they had—successfully, he thought—substituted the policy of peace with profit. Bearing upon the question of policy, said the Chairman, was the necessity for the

REVISION OF PRICES.

They had reduced the price of the Welsbach mantle—which they believed to be the best article in the market, and which they must always endeavour to maintain as the best—so that it could now be purchased by users at 6d.; and they had also lowered the price of Sunlight mantles, so that they could now be had at 4½d. each. He gave it as his opinion that it was safe to assume that the sale of the Sunlight mantle would not prejudice the business in the more expensive kind; and the figures available, he said, bore out this view. In the autumn of last year, the then Executive adopted the extraordinary course of putting the Sunlight mantle on the market, but selling it through different agents from those supplying Welsbach mantles. On one side of a street was to be found a man selling Welsbach mantles, and no others; and on the opposite side was another man selling Sunlight mantles in opposition to him. This lasted only two or three months, but long enough to show that there was a very large demand for the Sunlight mantle, and that it did not prejudice the sales of the Welsbach mantle. They had also issued a revised price list for

burners and other articles. The Welsbach burner, like the Welsbach mantle, they intended to maintain, as they believed it was the best. There were two other items treated of by the Advisory Committee, which, in view of the large figures they had been dealing with, might be called incidental savings—namely, income-tax £2842 and retaining fees stopped £1455. It had been the custom of the Company to retain a certain number of experts; but the Board did not think it was right to continue doing this under the existing circumstances.

The Accounts.

The Chairman next proceeded to deal in an exhaustive manner with the accounts; comparing the figures with those for the previous year. He remarked that without doubt the item of "consideration for undertakings and property, including patents, patent rights, goodwill, &c., £3,251,402," was grossly in excess of the value of these assets. The new factory at Wandsworth figured at £20,743. By a series of blunders, the original estimated cost of these buildings would, he regretted to tell them, be considerably exceeded. It would probably cost them another £15,000 to complete and equip the buildings. To give an instance of these blunders, the London Building Act prohibited any building of the warehouse class to exceed 250,000 cubic feet, unless divided; while the building at Wandsworth was to be in all 457,000 feet, in direct defiance of the requirements of the Act. The £15,000, cost of debentures in the Kern Burner Company (since cancelled, as he had already explained), was also, he thought, very greatly in excess of the value of the patents that were taken in exchange; and it ought never to have been carried to capital account. Stock-in-trade was put down at £75,144, as compared with £117,216. The principle upon which this stock had been valued was that where it was new or saleable it was taken at cost, unless it could now be bought cheaper. Where it could be purchased to-day at a lower price, it had been taken at that lower price. What was old—and he was sorry to say a great deal of it was—had been written down to its present value. In one case, some stock that formerly stood at £1678 had been sold for £350. There was another lot which they could not find anyone to remove; and they would have eventually to pay somebody to cart this stock away. Then, again, some stock that cost them 2s. 6d. per item could now be bought at 1s. 9d., and so was reckoned at the latter figure; while some more which cost 1s. 10d. per item could to-day be purchased at 1s. 1d. With regard to the remainder of the stock, he had looked very carefully into the price at which it had been taken; and he could conscientiously say that it fairly represented its realizable value—at any rate, he should not care to give more for it. Proceeding, the Chairman remarked that there seemed to be some misunderstanding with regard to the recommendation of the Committee and the opinion of the Board as to

Writing Down the Capital.

There was really no difference of opinion between the two. If, however, there was the slightest difference, it was that the present Board were more fully convinced than the Committee of the necessity for writing the capital down; but they thought it better not to deal with the matter at that meeting. Their new policy and their revised price list had really only been in operation for three weeks; and he would indeed be a bold man who would say he could put before the shareholders a complete scheme based on so short a period. The Board therefore recommended the proprietors to leave the matter over for the present. When the time came to deal with it—and this must be at as early a date as possible—the Directors proposed to call a meeting, and perhaps a Committee of the shareholders might succeed in hitting upon an equitable scheme. Turning to the item "Profit and loss account: Balance appearing as profit in last balance-sheet £66,002," the Chairman explained that they said "balance appearing as profit" because, had the position been faced last year there would have been a much smaller figure, and the present balance would have been proportionately increased. Passing to the profit and loss account, the gross profit on trading for the year, £123,499, compared with £122,793, and so was practically the same. It was not, he remarked, so much to the immediate increase of the gross profit that they must look for an improved position as to the reduction of the fixed expenses. The dividend at the rate of 40 per cent. per annum on the shares in the Austrian Company, from which was deducted £1689, the cost of the Welsbach Company's representation on the Board of the Austrian Company and the rent paid to the Boden Credit Anstalt for the custody of the certificates and expenses, represented a return of about 3 per cent. on the cost of the shares. This item of £1689 would, however, he was glad to say, disappear from future accounts. The old Board seemed to have paid a rental of £500 a year simply for taking charge of their bearer shares and once a year cutting off the coupons; whereas the Company's own bankers had now undertaken the custody of the certificates and the collection of the dividends without making any charge whatever. The representation on the Board of the Austrian Company would also be re-organized. As regarded the advertising, Mr. T. J. Barratt, the Chairman of A. & F. Pears, had kindly undertaken the management of this department; so that on that head nothing more need be said. Royalties payable for Chalmers's anti-vibrator represented a dead loss of about £2500. The terms were that the Company should pay royalty on 100,000 per annum; whereas they had only sold about this number during the whole period. Law and incidental charges figured at £16,362, as compared with £12,549, or an increase of about £4000. What this item would have been in the accounts for the current year had the old policy been continued, the Chairman said he would not like to predict; but he thought it was reasonable to suppose that the amount would be reduced in the future. It certainly would be, in consequence of the suppression of one department which came under this heading—namely, the

Employment of Detectives

to go about the country for the purpose of prying into people's business, with the object of taking proceedings against infringers. This unbusiness-like arrangement, of course, made the Company detested by the traders, and cost in addition several thousand pounds a year, which would be saved under the new *régime*. But the shareholders must, he said, bear in mind that the Board had a balance of that terrible heritage of lawsuits still to deal with; and if satisfactory arrangements were not come to, they might still have to fight some of these actions. There was also a possibility of new infringers coming into the field; and in this connection there appeared to be an impression that it was not the policy of the Welsbach Board to protect their patents by legal proceedings. This was an utter fallacy; and he wished to dispose of it at once. "Although," said the Chairman, "we do not propose to continue persecuting small traders and householders, it does not follow that we shall not take proceedings—and vigorous proceedings—against any responsible infringers. After dealing with some other items, the Chairman came to the accountants' charges and law costs incurred by the Advisory Committee, £2096; and in regard to this, he pointed out that no member of the Committee was paid anything for his services—not even his travelling expenses. As an investment, this outlay might be looked upon as the best the shareholders had ever made. It had already returned the original outlay about twenty times over. They would see that an amount of £20,000 had been transferred to suspense account to meet losses arising out of engagements contracted in previous years; and in the opinion of the Board this was a proper sum to set aside for the purpose.

The Auditors' Certificate.

The Chairman next referred at length to the certificate of the Auditors, in which they stated that "no depreciation has been provided in respect of the patents, patent rights, goodwill, £9166 share capital of this Company, shares in the Austrian Company, cost of the undertaking of the New Sunlight Incandescent Company, Limited, and the debentures of the Kern Burner Company, Limited, nor has anything been written off the benefit of contracts, all of which were included in the assets that formed the purchase consideration or have been subsequently acquired." Some of the self-appointed critics, he said, appeared to put a construction upon this certificate which it ought not to bear; for it was almost identical with that of the previous year. As to the possibility of writing off depreciation of patents and goodwill, it was rather late to start doing this now. If they were to attempt to accomplish it during the life of the patents, they would require to apply about £400,000 a year for the purpose. If, also, they were to attempt to write down the depreciation in the value of the Austrian shares, all the profit they had made in the past, and all the profit they could hope to make during the life of their patent, would not suffice. The New Sunlight undertaking he did not consider need be depreciated to any considerable extent; they hoped to make it, under the new management, at least earn the amount paid as interest on its debentures, and it was not too much to hope that in the course of a year or two it would earn something more than this. With regard to nothing having been written off the Kern Burner Company debentures, he repeated that this amount ought never to have been carried to capital. As to the remark that nothing had been written off contracts, this, he said, appeared very much like an attempt to lock the stable door after the horse had gone. The Chairman next dealt at length with the affairs of the Austrian Company; fully explaining several points with regard to capital and other matters.

Conclusion.

He then said he thought that he had dealt with every subject, and with all the recommendations and findings of the Advisory Committee. It therefore only remained for him to advise the shareholders of their very great indebtedness to the members of the Committee, who devoted seven or eight months of their very valuable time to what certainly stood out as the most exhaustive inquiry and report that had ever been made with regard to any company. He would also remind them of their indebtedness to Mr. Peters, who came forward at a time when his services were of the greatest value to the undertaking, and who loyally helped the Board to restore the fortunes of the stockholders. The Chairman then moved the adoption of the report, which was seconded by the Vice Chairman (Mr. M. W. Mattinson, K.C.), who said the Chairman desired him to add a few words on one subject—namely, with regard to the reduction of capital. He entirely agreed that the capital must be severely cut down. The Advisory Committee in their report expressed the opinion that the concern was enormously over-capitalized; and he did not think this statement was in any degree over-coloured, or in the slightest sense an exaggeration. It was a plain statement of an obvious fact. The Board had not that day presented any definite scheme, for reasons which could be easily understood. In the first place, during the two or three months they had been in control, they had been fully occupied with two urgent questions, neither of which brooked delay—the necessity of applying some treatment to the mass of litigation, and the need for cutting down the preposterous scale of expenditure. With regard to the latter point, he thought the scale of expenditure which prevailed was as much out of proportion to the business done as the capital was out of proportion to the solid assets. The Board had, however, made substantial progress in connection with both these matters. But this had occupied all their time; and even had it been desirable, it was not possible for them to apply themselves to the question of the re-adjustment of the capital. More than this, even if they had had time at their disposal, he did not think it would have been right for them at that meeting to have submitted any definite proposition, because it was essential that nothing should be done without the general feeling of the shareholders being first ascertained. There would have to be something approaching unanimity; and in order that this might be secured, it was necessary that the shareholders should be able to form some judgment as to the prospects of the Company in the near future. The re-adjustment of the capital must be adequate and final, and one which generally commended itself. He quite agreed that a few months hence—when the Board would probably deal with the question—the future would still be more or less a matter of speculation; but there was reason to believe that at the end of this time there would be some indication of what the Company were likely to earn when working on commercial lines. As soon as ever they were in a position to do so, the

Directors would not hesitate to invite the shareholders to embark upon that thorough readjustment of capital which was necessary. The Chairman also asked him to give to the meeting a figure indicating the savings which during the last few months had been accomplished by the Advisory Committee and the Board. Without going into details, they might take it from him that during this period they had, as compared with the scale of expenditure twelve months ago, effected

SAVINGS WHICH TOTALLED TO £46,000.

This was exclusive of the saving which they hoped to effect under the head of law costs, but with regard to which they did not desire to say anything at the moment. Speaking generally, it might be taken that something like £40,000 or £50,000 had been saved; and this amount the Board hoped would be increased as time went on. This highly satisfactory statement by the Vice-Chairman was followed by some remarks and questions from the

OTHER SIDE OF THE TABLE.

The first to congratulate the Chairman on the lucid manner in which he had put before the shareholders the present state of affairs was Colonel Munday, who afterwards asked for some information as to the number of burners and mantles sold during the year. With regard to the licences, of course, there had not yet been much time for results; but there were, he said, rumours going about that there were a very large number of infringers still floating around—to such an extent that those who had taken licences were not much inclined to go on paying their royalties. Colonel Munday had several other points he desired to bring forward; but the meeting appeared to be somewhat out of sympathy with him. He, however, elicited the information from the Chairman that the four depôts referred to were solely for the supply of the trade. Mr. Mackworth Praed, as one of the principal agitators for the removal of the old Board, said he also wished to express his thanks to the present Board for the time and trouble they had devoted to the interests of the Company. Several other shareholders having spoken, the Chairman, in reply to Colonel Munday, said the number of burners and mantles sold was purposely omitted from the report, as the Board did not think it policy to publish to the world figures which greatly benefited their would-be opponents. He would, however, give some figures which might be of interest. The depôts, between April 1 and July 13, showed an increase over the whole trade of the branches of more than 150 per cent.; while the total sales of mantles for the same period—which included the dull months—were over 40 per cent. more. Since July 1, when the new prices came into operation, the increase had been 115 per cent. over the same weeks of last year. As to the remarks about infringers who would not pay their royalties, there were none due yet, so they could not expect them to be paid. With regard to the recent fire, the whole of the claim had been settled with the Insurance Companies; and very shortly the rebuilding would be started. He did not care to make any forecast of what the profits of the Austrian Company might be next year; but he thought it very probable they would be less than in the past. They must not, however, regard the shrinkage as altogether loss, because if the profits of the Austrian Company were affected by the reduction in the price of fluid, the Welsbach Company ought to benefit to much more than a corresponding extent. The report was then unanimously adopted.

On the motion of the Hon. Philip Stanhope, seconded by General Russell, the following gentlemen were re-elected Directors of the Company: Mr. E. Williamson (Chairman), Mr. M. W. Mattinson, K.C. (Vice-Chairman), Mr. T. J. Brinsmead, and Mr. W. W. Wright, F.C.A. The Auditors (Messrs. Deloitte, Dever, Griffiths, and Co.) were also re-appointed; and a cordial vote of thanks to the Chairman and his colleagues concluded the proceedings.

THE PUBLIC LIGHTING OF LAMBETH.

Arbitration Proceedings under the Amalgamation Scheme of 1883.

Last Saturday, the Hon. P. W. PELHAM sat as Arbitrator at Richmond Terrace, Westminster, on behalf of the Board of Trade, to decide what price the Gaslight and Coke Company should charge the Lambeth Borough Council for the public lamps within the Company's area in the borough. It appeared that in March, 1900, the Gaslight and Coke Company wrote that the price of gas for public lamps would be increased from 2s. 1d. to 2s. 4d. per 1000 cubic feet. At that time the South Metropolitan Gas Company were charging 2s. 1d. per 1000 feet for the public lamps in Lambeth; and it was contended that, under the Amalgamation Scheme entered into in 1883 between the London Gaslight Company and the Gaslight and Coke Company, they were only entitled to charge the same price as the South Metropolitan Gas Company for gas supplied for public lighting. Under that scheme, any difference regarding its interpretation was to be determined by the Board of Trade.

Mr. CRIPPS, K.C., Mr. DANCKWERTS, K.C., and Mr. FRERE (instructed by Messrs. Bedford, Monier-Williams, and Robinson) appeared for the Company; Mr. MUIR MACKENZIE (instructed by Mr. Henry J. Smith, Town Clerk) represented the borough of Lambeth.

Mr. CRIPPS said the case raised somewhat similar points to those decided in the case of the City of London against the Gaslight Company, where Mr. Lyttelton acted as Arbitrator for the Board of Trade, who gave a decision in favour of the Company. The present case depended upon one section of an Act of Parliament, and one clause of a Scheme. The Act of Parliament was the City of London Gas Act of 1868, and the section 86, which said that the gas supplied to public lamps was limited to the lowest price charged by them at the same time to any private consumer. If that lowest charge depended upon any special conditions of a special agreement, then the matter was to be determined by arbitration. If the charge was not a scale charge, but fixed owing to special conditions, then the Company were not bound to make such lower charge, but might come to arbitration in order to see whether the charge which they were making was justified or not. The real question would turn upon the proviso to section 39 of the Amalgamation Scheme of 1883, which said: "Provided also that the Gaslight and Coke Company shall not charge in the districts south of the Thames a higher price per 1000 cubic feet of 16-candle gas, either for public or private lighting, than the price for the time being charged by the South Metropolitan Gas Company for gas of the same illuminating power; and section 86 of the City of London Gas Act, 1868, shall apply as against the Gaslight and Coke Company to the whole of the public lamps supplied with gas of similar quality, but not to private consumers, within their district north of the Thames." The suggestion here was that the South Metropolitan Company were giving better terms than the Gaslight and Coke Company, and that Lambeth were entitled to the same terms that they got from the South Metropolitan Company. He contended, first, that the Gaslight and Coke Company were charging the same price as the South Metropolitan, having regard to the terms of this proviso; secondly, so far as there was any difference between them, it depended upon the special conditions of special contracts which would be outside of this proviso of section 39 altogether; and, thirdly, this proviso did not apply at all, because, under an Act of 1900, the South Metropolitan Company were now entitled to supply, and did supply, not 16-candle but 14-candle gas. Therefore the test as regards the price for the time being charged by the South Metropolitan Company for gas of the same illuminating power was not in fact supplied by the two Companies.

The ARBITRATOR: You say that the South Metropolitan Company are not supplying the same illuminating power as you are.

Mr. CRIPPS: No; they are supplying 14-candle and we are supplying 16-candle gas. We are charging 2s. 5d. per 1000 cubic feet, and Lambeth say they ought not to pay more than the price they are paying to the South Metropolitan Company—viz., 2s. 1d.—for public lighting. But the Board of Trade returns show that the South Metropolitan Company are charging 2s. 3d. for 14-candle gas; and we say the 2s. 5d. we are charging for the 16-candle gas is the same as their general charge of 2s. 3d. for 14 candles, or 1d. difference as regards each candle illuminating power—that 2s. 3d. for 14-candle gas is their general rate for public or private consumers, and ours is 2s. 5d. for 16 candles. The South Metropolitan Company have entered into a contract, as regards the public supply in Lambeth, by which they introduce the Welsbach system into some of the leading thoroughfares; and they charge a percentage on the lamps, which works out at something like 2s. 1d. per 1000 feet. It is really on a percentage basis; but this applies to only about one-thirtieth of their public lamps. Now what is the price for the time being charged by the South Metropolitan Company? It is a price which they charge as a general charge and irrespective of any special terms of a special contract where there may be give and take as between them and a particular local authority south of the Thames. Having regard to the change which has been made by the South Metropolitan Company, this proviso no longer applies, because you have not got the test—viz., the public lamp supplied with gas of similar quality. Until you have the same illuminating power, the basis of comparison no longer exists, because what I say as regards this penny is only a convenient way of bringing the matter to your mind. We do not admit that the penny is the proper way of allocating between the 14 and the 16 candle gas as regards an obligation of this kind. Besides, the price under the special agreement with Lambeth includes other matters than the mere supply of gas for so much per 1000 cubic feet.

The ARBITRATOR: You say I cannot calculate under this arrangement of so much per lamp, because there is no basis for working out the cost per 1000 cubic feet.

Mr. CRIPPS: There is none. You will also see that agreement is not based entirely on the price or cost of gas; it is based on other considerations as regards putting up the incandescent burners and advancing the money for doing it, and a variety of other things.

The ARBITRATOR: Then the answer is that they should charge Lambeth more, not less, if they do more.

Mr. CRIPPS: When you come to terms and special arrangements between the two bodies, there are interests and motives on both sides which come into consideration; and as between the parties it may very properly upset the general price charged by the Gas Company. The principle of the Amalgamation Scheme of 1883 is the price "for the time being charged for gas of the same illuminating power;" and this means the price charged generally, in the absence of those special arrangements and conditions, at per 1000 cubic feet. In other words, it is 2s. 3d., which, in fact, is being charged at the present time both for public and private lighting in the southern districts of London, where there are no special conditions and no special contract; because where the 2s. 1d. is being charged as regards some lamps in Lambeth, it is as an incident to the special contract, and it is only where there is this special contract that there is that incident as regards charge. Where there is no special charge—where the conditions are general and where the charge is general—it is 2s. 3d., which is the charge that we are making; and that is the test. Of course, everyone knows why the agreement was made; it was not made in hostility to the Gaslight and Coke Company, but to deal with the question of electric lighting. It was to show that the Welsbach incandescent system was a better method of street lighting than electricity.

Mr. MUIR MACKENZIE, for the Borough of Lambeth, said that the Amalgamation Scheme, so far as the 39th section was concerned, was to protect the ratepayers of the parishes; and it provided that section 86 of the Act of 1868 was to apply, as against the Gaslight and Coke Company, to the whole of the public lamps supplied with gas of similar quality, but not to apply to consumers within their districts north of the Thames. His first contention would be that the effect of the section was that the Gaslight and Coke Company were not entitled to charge more for public lamps supplied by meter than the South Metropolitan Company were charging for public lamps supplied by meter; secondly, he submitted that the terms of the special agreement which was made with reference to the lamps supplied at a fixed charge

per year had no application whatever; and, thirdly, he submitted that, at any rate, it did not hold good as regards the period that was in contest till the Midsummer of 1901, when the South Metropolitan Company first gave notice that they intended to supply 14-candle gas. During the year 1900, and up to Midsummer of 1901, the gas supplied by the South Metropolitan Company was of 16-candle power; and the application to the Board of Trade to determine this question was made before the South Metropolitan Company had to charge for 14-candle power. The state of things when the Scheme of 1883 was passed must be borne in mind. At that time, the Gaslight and Coke Company supplied either totally or mainly the north of the Thames; and the South Metropolitan and other Companies in the South of London were supplying the South London district. The standard for fixing the price of the London Gas Companies south of the Thames was lower than that of the Gaslight and Coke Company north of the river; and it was a distinct advantage to the public south of the Thames that they should have these lower rates. Now the South Metropolitan Company were not charging 2s. 1d. under any special arrangement, but they were charging it in the same way to the public as to private consumers, per 1000 cubic feet for 16-candle gas—that was for the quarter ending March, 1900, to the quarter ending June, 1901.

Mr. DANCKWERTS: That was coincident with the institution of the incandescent system.

Mr. MUIR MACKENZIE: Well, that had to do with the supply when both Companies were furnishing gas of 16-candle power. As to the price charged by the South Metropolitan Company for 14-candle gas, he had thought the matter carefully over with his friend Mr. Smith (the Town Clerk), and they could not now contend that the 14-candle power of the South Metropolitan Company could govern the price charged for the Gaslight and Coke Company's 16-candle gas. But the period from March, 1900, to June, 1901, for which the price charged by the South Metropolitan Company was for 16-candle gas supplied for public lighting, was that which governed the Gaslight and Coke Company's charges.

Mr. CRIPPS, in reply, said they were not governed at all by any special agreement in the South of London, but by the general price as returned to the Board of Trade.

The ARBITRATOR: I suppose if all the districts had adopted special arrangements, the effect of this proviso might be rendered altogether nugatory.

Mr. CRIPPS: I think so.

The ARBITRATOR: As it is almost admitted it is rendered nugatory by the illuminating power. What is the amount involved?

Mr. MUIR MACKENZIE: £800.

Mr. CRIPPS: It is more or less substantial; but we come here to discuss the general question, which might have been £700 or £800 a year. This would have been a very important thing, and would have affected our price north of the Thames.

The ARBITRATOR: What districts do the Gaslight and Coke Company supply?

Mr. CRIPPS: Lambeth, Southwark, Battersea, and Wandsworth.

The ARBITRATOR: They do not supply the whole area of any borough south of the Thames.

Mr. FIELD: No; we shall supply you with a map.

The ARBITRATOR: The question I have to determine is one of damages or repayment of money.

Mr. MUIR MACKENZIE: Yes. We have paid at the rate of 2s. 1d.; and we say that we have been overcharged by £789.

Mr. CRIPPS: There will be no question about the amount if we get the principle settled as to whether it is governed under the special conditions or the general price given in the Board of Trade returns.

DEVONPORT CORPORATION GAS-WORKS.

Large Extension Scheme Approved.

At the Meeting of the Devonport Town Council last Thursday—the MAYOR (Mr. J. M. Leest) presiding—a report by Messrs. Stevenson and Burstal with reference to the alteration and extension of the gas-works was under consideration. It will be remembered that the admitted need of large developments induced the late Gas Company to apply to Parliament for further capital, and that the Corporation opposed the Company and promoted a Bill, which was passed, authorizing them to buy the undertaking. Messrs. Stevenson and Burstal, in their present report, remind the Corporation that in May, 1901, jointly with Mr. T. Newbigging, they recommended that for all practical purposes the existing works should be abandoned, and suggested the alterations necessary for a new section of the works capable of making and supplying 1½ million cubic feet of gas per day. In the present circumstances, and in view of the probable growth of the undertaking, they find that works of this size would be too small, and would entail at a very early date the erection of a second section; while by a comparatively slight excess in expenditure over what was then estimated, works capable of turning out half as much again gas—viz., 2¼ million cubic feet a day—could very well be erected. The greatest daily output last winter was 1,249,000 cubic feet; whereas previous to this the maximum had not exceeded 1,088,000 cubic feet. It was, therefore, apparent that if all the gas they required could be given to the consumers, works of larger capacity than they previously intended ought to be constructed.

Describing the general plan of the works then proposed, Messrs. Stevenson and Burstal proceed to point out that the coal-stores will be constructed on the new piece of ground recently acquired, and will abut on the road. The coal will be brought by carts to the east end of the building, will be tipped into coal-breakers, and from there raised to the level of the roof by a conveyor, from which it can be deposited at any point in the coal-stores or conveyed to the hoppers above the retort-benches as desired. The coal will be removed from the stores by means of shoots into a tunnel through which the conveyor passes, and can be taken out of the store at any point along the length of the tunnel. By this means, all labour will be obviated in handling the coal after it has been deposited in the breaker. Adjoining the coal-store will be the retort-house and an installation of water-gas plant. It is proposed to use inclined retorts sufficient in number to make 1½ million cubic feet of gas a day. A conveyor will take the coke out of the retort-house and deposit it in the yard. The water-gas plant will consist of two sections, each capable of making 400,000 cubic feet a day; and they suggest that it should be of a type for manufacturing blue or "straight" water gas, which would pass into the second-sized holder at the present works, and thence be brought back through a meter to the retort-house, and after traversing the retorts pass forward with the coal gas through the condenser and other portions of the plant. The condenser recommended is that of Messrs. Clapham Bros., and of the vertical water-tube type, capable of dealing at the outside with 2½ million cubic feet of gas, it being advisable to have condensing power rather in excess than otherwise. They propose to utilize the present boilers, and put in another boiler of similar type and size, as it will be necessary in midwinter to have two boilers always in use; and it is advisable to have a spare boiler as a stand-by. With regard to the engines and exhausters, instead of having, as previously reported, two, each of 60,000 cubic feet per hour, it is proposed to have three, each of 50,000 cubic feet, so that in winter two can be operated and one kept for repairs or change. The present Kirkham washer is to be used, and another of the same capacity put in; but in front of these it is necessary to have scrubbers. These should each be 10 feet in diameter and 60 feet high, and would in the bottom compartment have a Livesey washer, and the remainder of the body filled with boards. These scrubbers and the washers it is proposed to arrange so that either scrubber or washer can be put in use or shut off, or both can be used at the same time or shut off as desired. The purifiers designed and ordered by the Company were sent for in great haste, and though they would have been very suitable for the existing works, they were not best suited for the new ones, in which water gas would be used. Messrs. Stevenson and Burstal have therefore designed these purifiers afresh, and propose to put in six boxes, each 30 feet square, in place of four boxes 30 feet square and two boxes 30 ft. by 15 ft. The lime purifiers necessary for the purification of water gas should be of the same area as the others, which are required chiefly for the coal gas. The land at disposal being somewhat limited in area, the best way to obtain a proper revivification of the oxide would be by placing it upon a floor above the purifiers, instead of removing it to another part of the works and spreading it on the ground. To minimize the employment of manual labour as much as possible, the spent oxide should be taken to the upper floor by means of conveyors under the purifiers and an elevator at the end of the purifying-house. From the upper floor the oxide, after being revivified, would be deposited in the purifiers through canvas shoots. Naturally these alterations increased the capital cost which it was at first expected would have been expended by the Company before the transfer; but the amount now required by Messrs. R. & J. Dempster for carrying out this portion of the works was very reasonable. As to the station meter, it was proposed to remove it to a position adjacent to the north entrance gate. It is of sufficient size to register the whole of the gas made upon the new section. A new holder and tank capable of containing 1½ million cubic feet should be erected upon the new site, together with caretaker's cottage and a small boiler for steaming the cups of the holder during frost. The existing large holder upon the works would also be used; and this would enable the Committee to very much reduce or entirely do away with Sunday labour, and thus reduce the amount paid for wages, as time-and-a-half has to be paid for all Sunday labour. It was intended originally that the gas should be distributed directly from the new gasholder site; but it was found that the cost of altering the leading mains to the town would be very great, and, therefore, it was proposed that the gas from the holder site should be brought back to the present site. Two new governors should be used—one to serve the whole of the district and the other for the Admiralty and Military services. They would be interchangeable; so that in the event of a failure of either, the other could be brought into use for both services. These governors should be of the self-acting type manufactured by Messrs. Braddock and Co. After the gas has passed through the governors, it should be treated with carburine when it does not come up to the standard of illuminating power; and for this purpose carburettors should be erected adjoining the governor-house. The scheme also included lavatories and bath-rooms, a mess-room, and other conveniences for the men. These works the Corporation should immediately construct, in order to supply the future demand for gas and to do it economically. The proposed new section will be capable of supplying approximately 400 million cubic feet a year. The consumption for the year ending May 31, 1901, was 227 million cubic feet; and adding the estimated increases for the past and the current years, the probable sale during this year will be 276 million feet.

In regard to the financial aspect of the alterations, Messrs. Stevenson and Burstal say that they have obtained preliminary tenders from firms of repute; and though in a few cases the prices are somewhat high, these prices were included, so as to make it certain that the cost will not exceed the estimate. The total estimated cost, including the purifiers, is £83,000. In the former report, the cost, exclusive of the purifiers, was estimated at from £55,000 to £60,000. The difference in cost is considerably less than the proportionate difference in the size of the works. For the purpose of ascertaining whether it will be remunerative to construct the new section proposed, they took into consideration the amount of the purchase money, which was about £160,000, including the debenture debt; and they assume that if these works were erected, the debt in the future would be £250,000. Upon the estimated sale of 276 million cubic feet of gas during the current year, this works out to just over £900 per million feet sold; and for this the Corporation would have perfectly new works, with the addition of certain buildings belonging to the old works, which could be used for workshops, store-rooms, &c. The lowest purchases of late years for companies such as that at Devonport, working under maximum price and maximum dividend, where they have been sold by arbitration, show a capital fund for the undertaking of over £1200 per million cubic

feet; so that, on this basis, the Corporation would still have an exceedingly cheap undertaking, with absolutely new works of manufacture of the most modern type. As to whether there would be any commensurate saving in the working of the undertaking, so far as could be ascertained from the accounts of the late Company, the cost of wages at the works and repairs of plant amounted, on the average, to at least 9½d. per 1000 cubic feet of gas sold; while, with the new plant, it is estimated that, for the first three years at least, the charge will not exceed 3d. per 1000 cubic feet. This saving of 6½d. per 1000 cubic feet upon the estimated sale in the current year would mean increased profits amounting to £7475. Mr. S. E. Stevenson, the Engineer and Manager of the works, was, moreover, of opinion that approximately 3000 tons of coal less would be required. On the present make of gas, if thoroughly good settings be used, this would mean, at 9s. per ton, a further saving of £1350, or a total saving of £8825. To this must be added the present profit, which Mr. Stevenson estimates this year will be between £2000 and £3000—say, £2500—bringing the total estimated profits for the first year of operating the new works to £11,325. The charge for interest and sinking fund upon £250,000, assuming 4½ per cent. as being sufficient to cover the two charges, would then be £11,125; showing a slight profit on the first year. This profit would be a continually increasing one as the business increases, and no further expenditure would be required upon the works until a consumption of 400 million cubic feet of gas a year was reached.

Whether it was decided to carry out the whole scheme or not, the Engineer strongly urged that further condensing power and the new purifiers should be provided immediately. The condenser in connection with the larger retort-house is so extremely deficient in power that the gas passing forward to the scrubbers is in winter time as high in temperature as 120° Fahr., even in the coldest weather; and it is probably very largely in consequence of this that naphthalene is so frequently deposited in the pipes and apparatus about the works. The condenser recommended is in two sections; and one of these sections, consisting of three towers, and capable of dealing with 1¾ million cubic feet of gas, could easily be erected at the outlet of the present 15-inch pipe condenser. For this condenser, in duplicate, the price quoted by Messrs. Clapham Bros. is £1317, which would include the erection of one portion immediately and the other portion at a later period, but not the removal or re-erection of the first section.

The purifiers ought also to be erected as quickly as possible, so that there shall be no fear of their not being fully brought into use in the winter of 1903. Messrs. Dempster's price for the purifiers and the ironwork pertaining to the house and the roof, and including the conveying and elevating apparatus, is £10,490; and the estimated cost of the foundations and brickwork in addition, and such other small parts as are not covered by Messrs. Dempster's contract, will amount to about £2500, or (say) £13,000 for the building and apparatus complete.

The Mayor having moved the adoption of the report,

Mr. R. H. Rendle objected to the expenditure of so large a sum as £83,000. He had carefully gone into the matter to see whether the outlay was justified and necessary, and had come to the conclusion that it was not. Would they be in a better position when the money was spent than they were now? He said most emphatically they would not. In May, 1901, Mr. Stevenson reported that the sum necessary for the reconstruction of the works was £55,600. To-day his estimate was augmented by £27,000, or half as much again. The reason assigned for increasing the capital expenditure was that in the future they would require a very large supply of gas. He demurred to that suggestion. With the new works, it was proposed to provide for a consumption of 400 million cubic feet a year. For the twelve months ended May 31, 1901, the consumption was 227 millions, and for the present year they were told it would probably not exceed 276 millions. Many of the larger shopkeepers were adopting the electric light; and he was informed that the Admiralty, who took a quarter of the gas produced, were considering plans for putting down electric plant for lighting the dockyard and other Naval establishments. In view of these considerations, they should proceed with caution in the enlargement of the gas-works. No doubt they might anticipate an increased consumption of gas from the adoption of the slot-meter system; but this would be entirely neutralized by the extension of electric lighting in the borough. He believed an expenditure of £10,000 or £20,000 on new plant would suffice for twenty or thirty years. In his opinion, the cost of Mr. Stevenson's scheme would reach £100,000; and if they spent this extravagant sum and then lost the custom of the Admiralty, they would be placed in a very serious position. He moved that the matter be referred back to the Committee for further consideration.

Mr. Gould said it was a question whether the Admiralty were profitable customers. He understood they paid 15 per cent. less than ordinary consumers.

Mr. P. C. Goodman remarked that the expenditure seemed large; but they were not asked to incur it all at once. They were advised by an eminent Engineer to bring the property up to date by spending possibly less than the Company wished to raise and spend. The mover of the amendment had been constantly and persistently opposed to the Corporation acquiring the property, and his present attitude was equally one of opposition.

Mr. H. Banbury, supporting the amendment, said he did not pin his faith to experts, but tried to do his own reasoning. They ought to have the advice of a second engineer before going in for the spending of £83,000.

Alderman W. Littleton said that Messrs. Stevenson and Burstal were engaged by the Committee to advise them in connection with the opposition to the Gas Company's Bill, and gave advice which the Committee took and which resulted satisfactorily. He was now prepared to follow their advice in this matter. One result of the new works would be that they would be able to do without Sunday labour. Extension was absolutely necessary. They could not supply the added districts of the borough until they had better means of producing and storing gas. When they tapped this new district, there would be a large increase in the demand for gas; and he hoped the Council would adopt the scheme and carry out the portion of the work which was immediately required.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 263.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	19—20	+1	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	July 1	5	Australian 5 p.c. Deb.	100—102	..	4 18 0
200,000	5	May 14	6¾	Bombay, Ltd.	6—6¼	..	5 0 0
40,000	5	,,	6¾	Do. New, £4 paid	4¾—4¾	..	5 9 5
380,000	Stk.	Feb. 13	12	Brentford Consolidated	255—260	..	4 12 4
270,000	,,	,,	9	Do. New	189—194	..	4 12 9
50,000	,,	,,	5	Do. 5 p.c. Pref.	128—133	..	3 15 2
206,250	,,	June 19	4	Do. 4 p.c. Deb.	111—114	..	3 10 2
220,000	Stk.	Mar. 13	10	Brighton & Hove Orig.	205—210	..	4 15 3
246,320	,,	,,	7	Do. A. Ord. Stk.	148—153	..	4 11 6
460,000	20	Apl. 11	10	British	39—41	..	4 17 7
50,000	10	Feb. 13	12	Bromley, Ord. 10 p.c.	23—25	..	4 16 0
82,850	10	,,	9	Do. 7 p.c.	18—20	..	4 10 0
500,000	10	May 14	7	Buenos Ayres (New) Ltd.	10—11	..	6 7 3
250,000	Stk.	June 24	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
150,000	20	July 11	8½	Cagliari, Ltd.	21—23*	..	7 3 6
100,000	10	June 12	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	54—56	..	5 7 2
550,000	Stk.	Apl. 11	12	Commercial Old Stock	265—270	..	4 8 11
251,875	,,	,,	9	Do. New do.	205—210	..	4 5 9
271,875	,,	June 12	4½	Do. 4½ p.c. Deb.	130—134	..	3 7 2
800,000	Stk.	May 28	8	Continental Union, Ltd.	138—143	..	5 11 11
200,000	,,	,,	7	Do. 7 p.c. Pref.	147—152	..	4 12 1
575,000	Stk.	Feb. 27	5	Crystal Palace Ord. 5 p.c.	120—125	..	4 0 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	122—127	..	3 18 9
91,140	,,	July 11	5	Do 5 p.c. Deb. Stk.	133—142*	..	3 10 5
486,090	10	Jan. 30	10½	European, Ltd.	19—20	..	5 5 0
354,060	10	,,	10½	Do. £7 10s. paid	14—15	..	5 5 0
15,243,200	Stk.	Feb. 13	4†	Gas- 4 p.c. Ord.	60—62	..	4 7 0
2,600,000	,,	,,	3½	light 3½ p.c. max.	90—52	+1	3 16 1
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	111—113	..	3 10 10
4,193,975	,,	June 12	3	Coke 3 p.c. Con. Deb.	93—95	..	3 3 2
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	May 14	10	Imperial Continental	204—207	+1	4 16 7
473,600	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Feb. 27	10	Liverpool United A	220—222	..	4 10 1
718,100	,,	,,	7	Do. do. B	165—167	..	4 3 10
306,083	,,	June 24	4	Do. do. Deb. Stk.	116—118	..	3 7 10
75,000	5	June 12	5	Malta & Medn., Ltd.	4¼—4¾	..	5 5 3
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100—110	..	4 10 11
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	June 12	3½	Monte Video, Ltd.	9—10	..	7 0 0
1,515,892	Stk.	Feb. 21	4½	Newc'tle & G'tesh'd Con.	103—106	..	4 2 7
346,855	Stk.	July 4	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
150,000	5	May 28	8	Oriental, Ltd.	7—7¼	..	5 6 8
135,000	4½	,,	8	Do.	6—6⅝	..	5 10 9
15,000	1	,,	8	Do.	1¼—1⅝	..	4 11 5

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Mar. 13	7	Ottoman, Ltd.	6¼—6⅝	..	5 3 8
851,070	10	Apl. 25	7	River Plate Ord.	10—10¼	..	6 13 4
300,000	Stk.	June 24	4	Do. 4 p.c. Deb.	93—96	..	4 3 4
250,000	10	Mar. 26	8	San Paulo, Ltd.	12—13	..	6 3 1
135,000	Stk.	Mar. 13	10	Sheffield A	239—241	..	4 3 0
209,984	,,	,,	10	Do. B	238—240	..	4 3 4
523,498	,,	,,	10	Do. C	237—239	..	4 3 8
5,850,000	Stk.	Feb. 13	5	South Met., 4 p.c. Ord.	124—127	−½	3 18 9
1,627,965	,,	July 11	3	Do. 3 p.c. Deb.	92—94*	..	3 3 10
380,940	Stk.	May 14	5	Southampton Ord.	102—106	..	4 14 4
87,950	,,	July 11	4	Do. 4 p.c. Deb.	100—103*	..	3 17 8
120,000	Stk.	Feb. 27	5½	Tottenham and Edmonton A. 5 p.c. B. 3½ p.c.	120—125	..	4 8 0
260,520	,,	,,	4		95—100	..	4 0 0
182,380	10	Jan. 16	5	Tuscan, Ltd.	7—8	..	6 5 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	95—93	..	5 2 0
230,000	5	Mar. 13	6⅛	West Ham, 10 p.c.	10—11	..	4 6 4
172,030	10	,,	6½	Do. 7 p.c.	13—14	..	4 12 10
				WATER COMPANIES.			
780,599	Stk.	June 24	11⅛	Chelsea, Ord.	300—310	..	3 14 2
150,000	,,	,,	5	Do. 5 p.c. Pref.	152—157	..	3 3 8
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—143	..	3 2 11
175,785	,,	Mar. 26	4½	Do. 4½ p.c. Deb.	140—145	..	3 2 1
1,720,560	Stk.	Mar. 26	8	East London, Ord.	217—222	..	3 12 1
654,740	,,	June 12	4½	Do. 4½ p.c. Deb.	142—147	..	3 1 3
1,018,046	,,	,,	3	Do. 3 p.c. Deb.	96—98	..	3 1 3
700,000	50		8	Grand 10 p.c. max.	112—117	..	3 8 5
310,000	Stk.	Mar. 26	4	Junction 4 p.c. Deb.	127—130	..	3 1 7
708,000	Stk.	Feb. 13	16	Kent	230—300	..	5 6 8
160,000	,,	,,	7	Do. New, 7 p.c. max.	200—210	..	3 6 8
1,043,800	100	June 24	11	Lambeth, 10 p.c. max.	295—305	..	3 12 2
406,200	100	,,	8½	Do. 7½ p.c. max.	210—220	..	3 17 3
350,000	Stk.	Mar. 26	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
500,000	100	Feb. 13	12,⅝	New River, New Shares	400—410	..	3 2 5
1,000,000	Stk.	Jan. 30	4	Do. 4 p.c. Deb.	127—132	..	3 0 7
902,300	Stk.	June 12	7	South- Ord.	190—195	..	3 11 10
126,500	100	,,	7	wark 7½ p.c. max.	180—185	..	3 15 8
489,200	Stk.	,,	5	and 5 p.c. Pref.	152—157	..	3 3 8
1,019,585	,,	Apl. 11	4	Vauxhall 4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	June 12	10	West Middlesex	275—285	..	3 10 2
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	139—144	..	3 2 6
200,000	,,	Mar. 13	3	Do. 3 p.c. Deb.	66—68	+1	3 1 3

* Ex div.

† Next dividend will be at this rate.

Mr. W. FORD said the present works were worn out and quite incapable of producing the gas required.

The MAYOR, replying to a question, said it was proposed to spend £20,000 now, including £7000 for land.

The amendment was rejected, only four members voting for it, and the report was adopted.

BRADFORD GAS AND WATER UNDERTAKINGS.

A Special Meeting of the Bradford City Council took place last Tuesday for the purpose of fixing the amount of the general district rate for the year ending March 31 next; and in the course of his statement as to the position of the finances of the city, Mr. J. A. Godwin, the Deputy-Chairman of the Finance and General Purposes Committee, made some reference to the gas and water undertakings.

Alluding to the Gas Department, he said the question of public lighting had of late received considerable attention from various sections of the Council, especially in the direction which, by the recent vote, had found expression in what might be termed "direct taxation," and the charge of £17,850 in the present estimate under the general district rate was a practical confirmation of the principle. As to the value of the principle, there could doubtless be no question; but, like all principles, it was open to abuse. That any section of the ratepayers should be called upon to pay a higher price for a commodity in order to subsidize another section of the ratepayers who did not use the commodity, and therefore did not contribute towards it, was an injustice, went without saying; and in order to remedy such injustice, and as a mark of the sincerity of the convictions as to the worth of the principle, the Council were not asked during the present year to make any further appropriation from gas profits in relief of rates. Of course, it might be asserted that the Council could not do otherwise, from the fact that there was a debit balance of £8678. It might with equal truth be affirmed that against such balance there was standing to the credit of the reserve fund, which had been fed from exactly the same source—viz., from gas consumers—the sum of £25,000, leaving a net unappropriated profit of £16,322. Moreover, the net unappropriated electricity profit had always remained undisturbed, and still stood at £12,802. The sum of £17,850 was included in the general district rate for lighting purposes. The congratulation to which the ratepayers were naturally entitled in the retention of the same poundage as last year, despite the additional burden of public lighting, was certainly emphasized by the fact that they had side by side therewith the decreased charge of 3d. per 1000 cubic feet for gas for three quarters of the year—from July 1 to March 31 next. And although this represented, so far as the period was concerned, three quarters of the year, yet it was that particular three quarters in which the proportion of gas consumed exceeded the periodical proportion, and worked out at 85 per cent. As £17,850 was 85 per cent. of £21,000, the reduction in the price of gas was equivalent to 3·46d. in the pound on the rates. In other words, although it was added to the rates, and the poundage not increased, it was equivalent to a reduction in the rates to that extent as compared with last year. One need scarcely enter into the financial history of the gas-works. It was, perhaps, sufficient to say that since their purchase in 1871 they had made large profits, by which the rates had from time to time been relieved. The net profit up to the end of the last financial year was £459,048, out of which the department had contributed to the relief of rates and revenues £427,100, created a fire insurance fund of £20,000, and assisted in other directions. In addition, it had borne the cost of public lighting since the year 1881—estimated at no less than £427,400, or an average of £20,352 per annum. Unfortunately, during the last financial year the undertaking had sustained a loss of £11,600, in consequence of the high price of coal, the low price of residuals, and the charge for sinking fund upon the capital which had to be borrowed in respect of the purchase of the North Bierley Gas-Works. The net revenue account now showed a debit balance of £8678, with, however, a reserve fund of £25,000, or a net credit balance of £16,322. In this connection, it might be noted that as much as 8¼d. had been appropriated in relief of the rates; while the Council were not voting anything whatever for the current year. Though the increase in the city rate (as apart from the general district rate) was 6d. in the pound, a sum equal to 3½d. was being given back to the ratepayers in the reduction in the price of gas; and this left only 2¾d. extra. Furthermore, the Corporation had to make up the leeway caused by their not having appropriated any gas profits, whereas more than £10,000 was appropriated last year. Therefore, it could not be said that they were extravagant. They had, in fact, kept well within the mark.

Turning to the Water Department, Mr. Godwin remarked that the revenue for the past year showed the satisfactory result of £2515 as income in excess of expenditure, after payment of all interest and sinking fund charges, except the sinking fund charge in respect of the Nidd works, this being suspended under powers obtained under the 1897 Act until the year 1904. The same feature obtained in last year's accounts to the extent of £807; and in the year previous, of £1838. In fact, it had not been necessary to levy any rate in relief of revenue since 1897-8, when a 2d. rate was levied. The amount now standing to the credit of water revenue was £7624—certainly not a large sum for a reserve fund in the event of any contingencies; but it could not be regarded as other than satisfactory when it was considered that since the year 1894 there had been charged to the revenue account for interest on the Nidd works (which had not produced any corresponding income) no less a sum than £141,010, with £16,666 for sinking fund for the years 1896 and 1897, up to the time Bradford obtained the suspension of the sinking fund until 1904. Like other departments of the Corporation, the water-works had from time to time been assisted by a rate-in-aid, and also by the appropriation of gas profits; but taking the financial history of the works for the last 31 years, it could be shown that, had they received no extraneous aid, nor been

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called upon to bear the interest on the Nidd works and the two years' sinking fund prior to obtaining the power to suspend it, an accumulated profit would have been made of £109,670, or an average profit for the 31 years of £3538.

In the course of the discussion which followed, Mr. James Freeman, after referring at some length to the work of the Gas Committee, of which he is Chairman, claimed that though there was a deficit in the last year's working it was in no way due to unbusinesslike management, but to the high price of coal and the low price of residuals. In regard to the lighting of Heaton, he pointed out that an effort had been made to secure in the Shipley District Council's Bill, by which that Council acquired the Shipley Gas Company's undertaking, the insertion of a clause giving the Bradford Corporation the power of acquiring the rights of gas supply to Heaton. This clause, however, there was some probability would not be passed by Parliament, so that it seemed as if Heaton would have to go on paying 3s. 4d. per 1000 cubic feet for gas, while the rest of Bradford got it for 2s. 3d. He urged that a sum of £20,000 should be set aside to grant relief from a portion of their rates to the inhabitants of Heaton, in consequence of the fact that they were not granted gas at the same price as the rest of the city. Mr. Moser urged Mr. Godwin to take Mr. Freeman's request into consideration. He suggested that, as the price of gas was reduced, the price of electricity, which was also profit-yielding, should likewise be reduced. Mr. North, alluding to Mr. Freeman's request, suggested jocularly that the reserve fund of £17,000 which stood to the credit of the Gas Committee should be distributed between Heaton and Allerton. Alderman E. Priestley complained that the people of Bierley, where there were long stretches of road in which there were no gas-mains, would have to pay rates for the lighting of the city, although those who used no gas received no benefit from the reduction of the price. Alderman Ratcliffe said it was suggested that while the increase in the rates was 6d. in the pound, 3½d. would be given back in the shape of a reduction of the price of gas. They had to ask the ratepayers for no less than £42,078 more this year than last; and of that sum they were giving back £17,850 in the shape of a reduction of the price of gas. It was suggested by Mr. Godwin that this was equal to 3½d. in the pound; so that the whole of the remaining £25,300 was to be included in the 2½d., which was obviously contradictory. He was, however, quite aware that there was an explanation, and that it was the increase of the rateable value which accounted for the difference. Mr. W. E. B. Priestley pointed out that the successful Committees had been the productive ones. Gas, electricity, tramways, and water had undoubtedly paid. This ought to indicate to the Council the lines of their future policy for the management of the affairs of the city. If the Corporation undertook anything which was for the benefit of the whole community, and managed it in a businesslike way, it might fairly be expected to prove successful. Mr. Jowett welcomed the observations of Mr. Priestley as to the lesson of the success of the productive Committees. The great burden of these undertakings was the payment of interest and sinking fund; and if they used their own accumulated profits they would be free from this necessity.

ACETYLENE LIGHTING AT LAUNCESTON.

At the Meeting of the Launceston Town Council yesterday week, some discussion took place on the question of the cost of public lighting. In June of the past year, in consequence of a difference with the Gas Company, the Corporation decided to make a trial of acetylene lighting. At the previous meeting Mr. J. Treleaven asked what the acetylene plant had cost, and what had been the expense of lighting by acetylene instead of gas. The Mayor (Mr. C. B. Shuker) refused the information on the ground that Mr. Treleaven, as Manager of the Gas Company, had no right to take part in the discussion of the question of the lighting of the town. Mr. W. L. Powell, a member not interested in the Company, now repeated the questions, which he said he believed to be in the general interest of the town. The Mayor, in reply, read a report by the Lighting Committee. From this it appeared that the average cost of the 14 acetylene lamps which had been installed worked out at £60, or £4 6s. per lamp per annum. After allowing for depreciation of plant, &c., the net cost was £4 14s. per lamp. Taking into consideration the facts that carbide was greatly reduced in cost, that the railway rates were lower, and that the system was now beyond the initial expensive experimental stage—circumstances which led them to believe the lamps could be maintained for £3 5s. each per annum—the Committee recommended the continuance of the system for another year. The payments to the Gas Company for the past three years had been as follows: 1900, 110 lamps, £298 9s. 9d.; 1901, 112 lamps, £334 12s. 9d.; 1902, 101 lamps, £280 11s. 9d. The 14 lamps lit by acetylene gas cost £65 12s. 9d., which, added to the £280 11s. 9d. paid to the Gas Company, gave a total cost of £346 4s. 6d. for the lighting year ending the 2nd of August next, compared with £334 12s. 9d. in the previous year, when there were three outer circle lamps less than at present. The Committee felt that they were justified in carrying out the acetylene system, on the grounds of great improvement in the light in the main thoroughfares, consequent reduction in the price of coal gas, from which the whole town benefited, improvement in the quality, purity, and lighting power of the coal gas, and increased attention to the cleaning, lighting, and maintenance of the public lamps by the Gas Company. Mr. T. B. Hender, while of opinion that the lighting was improved, said the Committee had not justified the hope they held out of a reduction in the cost. The Mayor thought the Committee were too ambitious, and with regard to the acetylene lamps had given too much light. It was not necessary, in a town like Launceston, to have such a brilliant light as had been sometimes seen during the past year; and the Committee should keep an even balance between expenditure and necessity.

The Directors of Messrs. C. & W. Walker, Limited, have resolved to pay an interim dividend for the six months ending the 31st inst. at the rate of 5¾ per cent. per annum, less income-tax, on the preference shares, and on the ordinary shares at 10 per cent. per annum.

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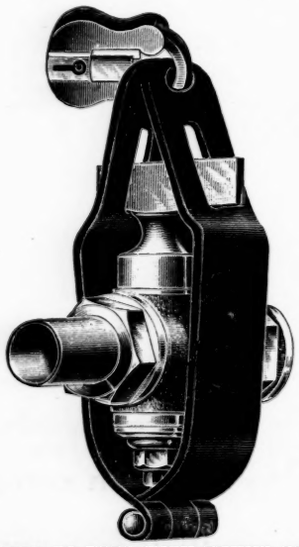
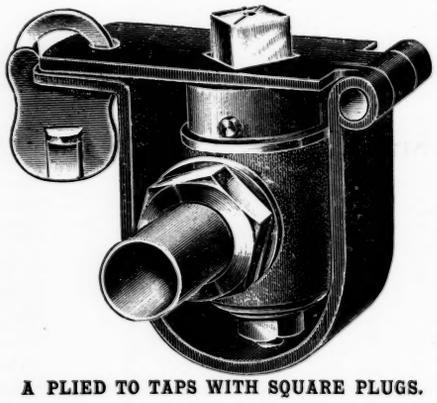


APPLIED TO TAPS WITH THUMB PLUGS.



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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The North British Association of Gas Managers met at Perth on Thursday, and had a very successful meeting, of which more afterwards. On this occasion, there was a question of all-engrossing interest, which, outside the walls of the meeting-place, was the universal subject of conversation, and quite eclipsed the official business. This was the filling up of the vacancy in the managership of the Dundee Corporation gas undertaking. That which lent zest to this matter was the publication, in the "Dundee Advertiser" on Wednesday, of a list of nine gentlemen who were said to be applicants for the post. This act was one of the most "blazing indiscretions" which have attended the course of this most unhappy affair. Applications were due on the 22nd, which was Tuesday. The publication of the list was on Wednesday—that is to say, on the evening of the day on which applications should have been addressed, someone assumed that they should have been received, and gave out those which had come in as the list. Now, it is a well known rule that in all matters of lodging documents, if they are placed in a post office in the United Kingdom before the last collection on the day upon which they are due, they are in time. Thus, for instance, if any gentleman in Shetland or in the Channel Islands had posted an application before the last postal collection on Tuesday, the application would have been in time. It might have been Thursday before such applications reached Dundee; and, consequently, the Town Clerk, to whom the applications were to be addressed, could not have made up a completed list in time to be published before Friday. Someone therefore rushed these names into print prematurely. It must, in truth, be said that the newspaper did not give the list as a final one. The sub-editors simply did what almost everyone else would have done—they published what they got. But who gave them the names? and what purpose was to be served by the publication of the incomplete list? Who can say? The workings of the Dundee Town Council, in this matter of the management of the Corporation Gas-Works, are "past finding out." It was common knowledge at Perth on Thursday that more than nine gentlemen had applied for the post. Three other names were mentioned. These have not yet (on Saturday) been given to the public. That there are other names which could be given is beyond dispute, because I have private information to-day to the effect that "a strong effort is being made to have one of the present employees appointed." There is no "present employee" in the list published. What is the situation, then? Did this employee apply? Or is it the case that after the other applications came in, it was felt that none of them were good enough for Dundee, and that he was asked to make application? This view cannot be accepted, because applications were due on the 22nd, and a local man could not take advantage of the privilege of residence in Shetland or the Channel Islands—unless he were on holiday. The situation is a mysterious one; and the mystery is deepened by the fact that since Wednesday no mention has been made in either of the leading newspapers in Dundee that further applications have been received or entertained, or, indeed, that there is such a thing as a vacancy in Dundee. The position is, to say the least of it, redolent of the "dark horse;" but the procedure is an enigma to me. The Corporation are not, and cannot be, held responsible for the publication of the list on Wednesday; but someone must be. Who he is, and what is his motive, may and probably will be evolved. The situation is not yet filled up, and it would be wrong to make comment which might be prejudicial to any one of the applicants. It is right and proper, however, to point out, even at this stage, that there are "ways which are devious" in this appointment. At whose door they lie is not apparent; and the Corporation will be lacking in self-respect unless, when they come to make the appointment, they shake themselves clear of all such imputations, and make it upon the merits of the different candidates. This note is not intended to indicate any preference for, or to exercise any influence on behalf of, any particular candidate, but simply to point out that there is a "back-stairs" movement in the matter which ought not to be in a public appointment. That this is the case is shown, first, by the premature publication of certain names; and, secondly, by the withholding from the public of the names of the other applicants. Now that the cat is, as it were, out of the bag, I may as well give the list as published. It is: James D. Smith, Manager, Stirling; Harry H. Gracie, Assistant, Granton; Alexander Waddell, Manager, Dunfermline; James Gibson, Manager, Beverley, Yorks.; Alexander Yuill, Manager, Alloa; David Vass, Manager, Airdrie; James Kincaid, Manager, Falkirk; Laurence Hislop, Manager, Bothwell and Uddingston; and W. B. M'Lusky, Manager, Perth. Rumour had it in Perth that other three gentlemen had applied—viz., Samuel Donald, Dundee; W. Ewing, Greenock; and a gentleman who is assistant in the Tradeston works, Glasgow. Surprise was expressed that only twelve applications had been made for a post for which the salary of £600 is spoken of; and the opinion was given vent to that there must be something which made men afraid to apply. That is the situation to-day. It is truly a wonderful one. There is a desire to have the post filled up as soon as possible, so there is likely to be a development during next week.

As to the meeting of the North British Association, there is but one opinion—it was a surprise, and an agreeable one. The programme was not an attractive one by any means. Only three papers were offered, in not one of which was there promise of anything of a nature specially attractive; and there was no other subject, such as that of the standardizing of meter-unions or the Murdoch Memorial Fund, to come before the members, as has been the case at North British gatherings for many years. It looked, to say the least, as if there was not sufficient on the programme to occupy the whole day, and that what was to be put before the meeting was not of so striking a nature as would bring the members out. What, in the event, happened, was

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that there was an attendance which was very much above the average, and that the papers and discussions turned out to be surprisingly good. Mr. J. Wilson, of Tradeston, as President, was content to almost efface himself, so that the business might get on the more expeditiously. He gave an address much shorter than usual, but full of interest; and during the day he showed the unmistakable hand of the Manager in his happy knack of keeping the members to their duties. They responded to his gentle ways, and thus time sped on. No one was wearied; and everyone was benefited. The papers I think I need not particularize. They were all upon subjects within the grasp—even more, in the hands daily—of every member; subjects upon which everyone is bound to have an opinion, and subjects, too, upon which opinions are widely different. The nature of the papers being such, the discussions upon them were copious; and there was an air of friendliness all over, which added greatly to the pleasure of the gathering. The meeting, in fact, was a thorough success from the point of view of attendance, and from the technical side as well.

A pleasant interlude was the visit to the Corporation gas-works at Friarton. Many of the visitors had seen them before. Those who had not, enjoyed a treat in the stroll through the beautifully equipped, and in all respects orderly, works which the Corporation now possess; and those who had, could not fail, on renewing acquaintance, to see traces everywhere of the care which Mr. M'Lusky is taking of the magnificent instrument that has been placed in his hands. The plant is in perfect order. There was no smoke, dust, or smell. So far, then, as these disagreeable properties are concerned, the works might be placed on the lawn at Drummond Castle; there would be scarcely any more nuisance from them than there is from an ordinary greenhouse. To so high a pitch of perfection has the construction of gas-works come, that the element of nuisance is all but eliminated.

The members as will be seen from the report of the proceedings, altered one of their rules by adding to it the proviso that the Secretary and Treasurer need not be a gas manager. That was done, of course, for the purpose of retaining the services, in that capacity, of Mr. R. S. Carlow, who has held the office for fifteen years. It is a tradition of the Association that the Secretary is not to be changed. Mr. Carlow is the fourth Secretary in the forty years' history of the Association. His predecessors were Mr. W. Mackenzie, of Dunfermline; Mr. David Terrace, of Glasgow; and Mr. Waterston, of Portobello. The Committee's recommendation that the rule be altered was adopted unanimously. The proposal was anticipated, and if opposition had been intended to be offered, there was time in which to do it. There was none, and Mr. Carlow was, consequently, justified when he returned thanks for the renewal of confidence in him. There was, of course, a feeling, expressed in private, to the effect that the step was a questionable one, and that it is desirable that the Secretary and Treasurer should be a member of the Association; but, in the special circumstances, the change in the rule was allowed to be made.

The Falkirk Town Council on Monday had before them the annual report by Mr. J. Kincaid, the Manager, and ordered it to be printed. It was reported that when the Corporation took over the gas undertaking there were 3000 consumers, and that there are now 5000. Mr. H. Russell, the Convener of the Works Committee, stated that it had been ascertained that there was a leakage of 90,000 cubic feet of gas per annum from long service-pipes; and it had been resolved to arrange for the meters being placed upon such pipes as near the main as possible, so that the owners of the pipes might pay for the defects. The price paid for coal, he said, during the past year, including wages, cartage, and maintenance, showed that the net cost of the gas produced was 1s. 10½d. per 1000 cubic feet. In that sum there was a charge of 2d. per 1000 cubic feet for cartage. They had, he considered, great reason to be proud of the very efficient management of their gas-works; and he thought the entire credit was due to the Manager.

The annual meeting of the Stirling Gaslight Company was held on Tuesday. It was stated that the £2500 authorized by the shareholders last year had been borrowed on mortgage. The expenditure on capital account during the year was £1142, and there was an increased expenditure on revenue account, in the relaying of mains to Causewayhead and Abbey Road. The gross profit during the year was £5354. From this there was paid interest, income-tax, and dividend on preference shares, and £500 was placed to the £5000 account, which was required by statute to be spent on works out of the revenue, thereby completing this sum. There remained a net balance of profit of £3899. A dividend was paid on the ordinary shares at the rate of 7s. each—about 6¾ per cent.; and there was left a credit balance of £1294. The price of gas was reduced from 3s. 7d. to 3s. 4d. per 1000 cubic feet, which is the standard price fixed by the Company's Act of Parliament. The revenue of the Company was £17,532, of which £14,599 was derived from the sale of gas, £362 as meter-rents, £1630 from coke, and £861 from tar and liquor. The total expenditure was £12,177, of which £7535 was for coal and the carriage of it. In moving the adoption of the report, the Chairman—Mr. James Johnston—said that the total sum spent on works since the Company obtained statutory powers was £21,861, including £5000 paid out of revenue, in addition to the expenses connected with obtaining their Act of Parliament, amounting to £4379. The works had been practically reconstructed, and should require little further outlay, except for extensions. The total quantity of gas made during the year was 94,746,000 cubic feet—an increase of 5,646,000 cubic feet over the preceding year. There are now 390 cooking-stoves—an increase during the year of 110—in use. There are also 272 grillers and 774 prepayment meters in use—an increase of 114 meters; and the coppers taken from them in the course of the year amounted to £1004.

The Nairn Gas Company held their 28th annual meeting on Monday. It was reported that in the past year the Company had had the largest output and the largest income in the whole of their history. Notwithstanding that the price of gas was reduced a year ago by 5d. per 1000 cubic feet, there was an increased income by £173. A dividend at the rate of 6 per cent. was declared, and this allowed a sum of £518 to be carried forward.

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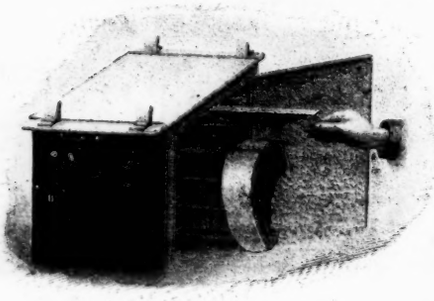

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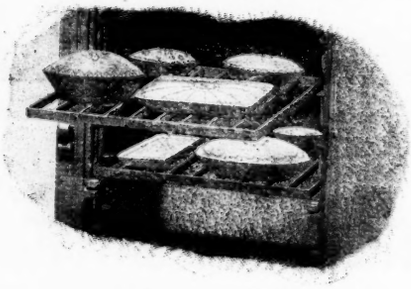

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 26.

Sulphate of Ammonia.

There has been a better tone in the market during the week, brought about by the covering of July contracts; and the closing quotations are £12 per ton f.o.b. Hull, and £12 2s. 6d. per ton f.o.b. Leith and Liverpool. Buyers are, however, only interested in prompt stuff, preferring to leave their August requirements for the present; while consumers are only interested at a substantial reduction on prompt prices. For delivery over the winter months, speculators are offering freely abroad at the equivalent of £11 10s. to £11 12s. 6d. per ton, according to position; but buyers, alarmed by this drop in prices, are not keen about operating.

Nitrate of Soda.

This is quiet, at 8s. 3d. to 8s. 4½d. per cwt., according to quality, on spot.

LONDON, *July* 26.

Tar Products.

Tar products generally are very quiet; and there is an entire absence of business, except as regards pitch, which is still remarkably firm for home consumption. Very high prices continue to be paid for small quantities; and business in South Wales is reported all over next year at fairly good figures. Carbolic continues to decline in value; 60's crude have been sold at 1s. 8½d., while 5⅝d. was accepted for 34/35's crystals. In creosote, there is nothing fresh to report. Manufacturers in the Midlands and in the North still appear anxious to sell for early delivery. For solvent and toluol there is really no demand whatever, and prices quoted are purely nominal. There seems to be more inquiry for anthracene for delivery over next year. Doubtless the very low prices now ruling make consumers desirous of securing their supplies forward, as it certainly will not pay to produce "B" quality, while the supplies of "A" are necessarily limited.

The average values during the week were: Tar, 17s. 6d. to 22s. Pitch, London, 50s. to 53s.; east coast, 47s. 6d. to 48s. 6d.; west coast, 42s. 6d. to 43s. Benzol, 90 per cent., 7¾d. to 8d.; 50-90 per cent., 7d. Toluol, 8d. Crude naphtha, 2½d.; solvent naphtha, 8d. to 9½d.; heavy naphtha, 9d. to 10d. Creosote, London, 1¼d.; North, 1d. Heavy oils, 1⅛d. Carbolic acid, 60 per cent., 1s. 8½d. Naphthalene, 35s. to 50s.; salts, 21s. to 22s. 6d. Anthracene, "A," 1½d. to 1⅝d.; "B," 1d. nominally.

Sulphate of Ammonia.

The market is decidedly dull; and there is very little inquiry for either prompt or forward delivery. Beckton is still quoted at £12. August-September, and £11 15s. October-March; while another London Gas Company are reported to have done business at £12 on their own special terms. In Hull, the market is quiet. Business has been done at £12 to £12 1s. 3d. for good grey; while lower prices are reported to have been accepted for discoloured. At Liverpool, a limited business has been done at £12 for early shipment. There do not appear to be any important transactions to report in Leith. Sellers' still ask £12 2s. 6d.; but it does not seem that consumers are willing to pay more than £12—and even at this they appear quite indifferent as to business.

COAL TRADE REPORTS.

Lancashire Coal Trade.

With the bulk of the principal contracts now settled, the usual gas coal season may be regarded as practically closed. Certainly there is not likely to be any further material change in prices; and it will be interesting to compare this year's contract rates with those of 1901. Last year, the increasing depression throughout the iron and steel trades was gradually making itself felt, especially in the lower qualities of round coal, in which competition from outside districts brought about successive official reductions amounting to 1s. 8d. to 2s. per ton. This, however, scarcely represented the real state of the market, actual selling prices being forced much more rapidly downwards; and during the first three or four months, steam and forge coals fell quite 2s. 6d. to 3s. per ton. The crucial test of the position, however, came when the large contracts for locomotive fuel and gas coal had to be renewed. These led to protracted negotiations before a basis could be reached that represented the maximum concession of the coalowners, and to some extent satisfied the demands of buyers. In renewing the contracts for gas coal, colliery proprietors were able to obtain what were really satisfactory prices; the Associated Collieries holding pretty firmly to a maximum reduction of 2s. 6d. on 1900 rates for good screened qualities, anything more than this being only conceded in exceptional cases, although one or two outside collieries gave way to the extent of 3s. per ton. This year it was seen that a further downward move upon the reduced rates of 1901 would be necessary to secure the renewal of contracts; but early on a very general arrangement was established among the associated coalowners in Lancashire not to give way more than 1s. as the general rule, with here and there a reduction of 1s. 6d. allowed as a special concession under exceptional conditions or for some of the very inferior sorts. In this stand, they had the co-operation of most of the Yorkshire gas coal collieries, although complaints of cutting by some of the coalowners in this district have not been infrequent during the season. One of the first large contracts to come upon the market was that of the Salford Corporation, and for this there was some very irregular quoting, which gave rise to a great deal of dissatisfaction among the Lancashire coalowners. Taking, however, the bulk of the gas coal trade, the understanding arrived at early on in the year has been fairly

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well adhered to. The following have been the average basis prices: For slack suitable for gas making, 7s. 6d. per ton upwards; for gas nuts, 8s. upwards; for screened Wigan four feet, 9s. to 9s. 3d.; and 10s. to 10s. 3d. for best screened Wigan gas coal, at the pit. For purposes of comparison, it may be mentioned that the average rates ruling on contracts in 1901 represented about 10s. to 10s. 3d. per ton at the pit for good medium, and 11s. 3d. to 11s. 6d. for best screened gas coal. The prices obtained in 1900 were 12s. 6d. to 13s. for medium, and 14s. to 14s. 6d. for best screened gas coal. Of course, here and there, and under some special conditions, there has been some slight giving way this season on the prices above quoted; but they may be taken as representing about the average quoted rates which the principal coal-owners have steadily maintained. Last year, the keenest contest was with the railway companies in the settlement of contracts for locomotive fuel; and pretty much the same conditions have prevailed this year. In 1901, colliery owners had to surrender very nearly the whole of the advance they were able to enforce on the previous year's contracts, and eventually they had to reduce their contract prices 4s. per ton; the basis contract price for locomntive fuel being about 9s., as compared with 13s. in 1900. This year, the Lancashire collieries made a great effort not to give way more than 6d. per ton.; but eventually they were forced into further concessions, and with one or two exceptions the railway companies have been able to place the bulk of their contracts on the basis of 8s. per ton at the pit, 8s. 3d. being got in some few instances.

With regard to the general trade of the district, except that stoppages at many of the collieries owing to disputes with the pit lads and datallers over the wages reduction have temporarily restricted the supplies of fuel coming upon the market, there is no very material change to report in the position, taking it all through. For the most part, prices are being steadily maintained; and apart from occasional special sales, they would seem now to have touched about the lowest point they are likely to reach during the remainder of the summer. In the lower descriptions of round coal suitable for steam, forge, and general manufacturing purposes, there is a weakness in prices for immediate clearance sales or short delivery contracts; but collieries are not disposed to enter into long forward engagements at anything appreciably under current list basis rates, which are about 8s. 6d. to 9s. at the pit. The engine fuel trade is maintaining the hardening tendency reported during the last two or three weeks; and this no doubt has been helped by the restriction of supplies—many collieries that had previously been forcing surplus on the market at very low-cut prices having now practically nothing to offer. Prices, consequently, show a firmer tone all through, at any rate, for the present, with the better qualities of Lancashire slack averaging 6s. 6d. to 7s. per ton at the pit, and common sorts from 5s. Shipping business is slow. Common sorts of steam coal are obtainable at as low as 9s. 6d., with better qualities quoted about 10s. to 10s. 3d. delivered at the Mersey ports. Coke is exceedingly strong, with full prices readily got, and some hardening here and there on forward contracts.

Northern Coal Trade.

The coal trade is on the whole steady; but, with a fair demand, there is a full production, and this has its influence on the prices of second-class coals, which do not seem to have been so much sold on contract as the best sorts. Demand is fairly good for best Northumbrian steam coals; and the price may be given as from 11s. 3d. to 11s. 6d. per ton f.o.b. Second-class steams are from 9s. 6d. to 10s., with a moderate inquiry; while steam smalls are now more plentiful, and may be quoted at about 5s. In gas coals, there is a slight increase in the local consumption; but it is still small when compared with that of a few months ago. Rates do not change very much; the price of Durham gas coals varying from 8s. 6d. to 9s. 6d. per ton f.o.b., according to quality. The better classes are most in request. The contract has been closed for a portion of the Copenhagen gas coal supply; it being allotted in part to two of the best collieries at a price that is said to be about 14s. 9d. per ton delivered, or perhaps 9s. 3d. per ton f.o.b. Gas coke is unaltered in price from last week's figures, though there is a slight increase in the production.

Scotch Coal Trade.

Last week being holiday week in Glasgow and in other places, there was no formal market, and no report can be given. The shipments reported were 234,424 tons—a decrease of 4677 tons upon the previous week, but an increase of 110,748 tons upon the corresponding week of last year. The great difference is due to the time of the holidays. For the year to date, the total shipments have been 5,632,529 tons—an increase of 463,427 tons upon the same period of last year.

Extraordinary Loss of Gas in Athlone.—A very serious state of affairs has been discovered in connection with the Athlone Gas-Works, which has caused much local discussion. At the last meeting of the Gas Committee, the returns for the months of May and June were submitted. It was found that during the first-mentioned month, out of 647,900 cubic feet of gas manufactured, there were 118,688 cubic feet unaccounted for, or a loss to the extent of 18·3 per cent. Following this came the statement that in the month of June there were 553,300 cubic feet manufactured, and the remarkable total of 218,120 cubic feet unaccounted for; making a loss for the month equivalent to 39·5 per cent. A meeting of the Urban District Council has been held to consider the subject, and a letter was read from Mr. W. F. Cotton, Managing Director of the Alliance and Dublin Consumers' Gas Company, who had been consulted. He said the loss referred to was certainly a big one, and it could not be put down to condensation. In his Company, with 700 miles of mains, the unaccounted-for gas was generally 6 or 7 per cent. The Manager (Mr. J. Bradley) said he had been told there were several leakages. He found one heavy one; and if they had a number of these it would account for the loss of gas. There was great difficulty in testing the mains. It was decided to send the Town Clerk to Dublin to confer with Mr. Cotton.

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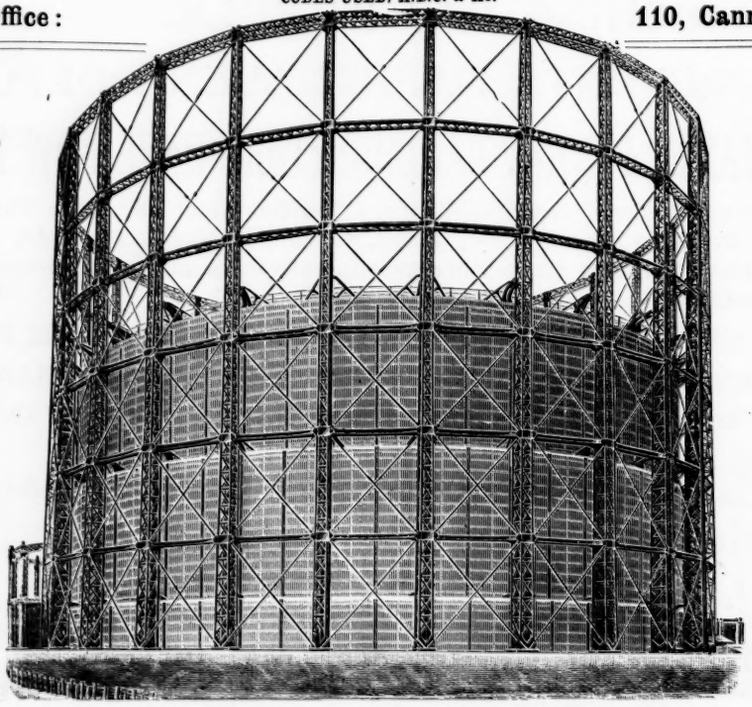

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Mansfield Gas and Water Supply.—At the last monthly meeting of the Mansfield Town Council, the annual reports of the Gas and Water Committees were presented. The former showed that, after payment of interest on loans amounting to £1952 18s. 4d., treasurer's interest £298 10s. 7d., and paying into the sinking fund £857 10s. 1d., a profit had been made of £1052 7s. 7d. After transferring to the working capital account £608 6s. 7d., to bring it up to £3000, the amount authorized, £444 1s. remained to be paid over to the relief of the rates—by far the largest sum since the acquisition of the undertaking by the town. The Committee decided to reduce the price of gas by 2d. per 1000 cubic feet. Alderman Blake expressed the great pleasure it gave him to state that they had had a very excellent year. They did not, however, think so much of the sum that would be handed over in aid of the rates, as of the fact that the price of gas would be reduced 2d. The Water Committee's report set forth that the result of the year's working was that after paying £1732 10s. dividends on stock, £55 16s. interest on capital temporarily advanced by the Treasurer, and £1497 15s. 11d. to the sinking fund, a profit of £663 3s. 2d. had been made, which had been transferred to the general district rate account. The reports were adopted.

Torquay Water Supply.—At the recent annual inspection of the Torquay Water-Works by the Town Council, the Chairman of the Water Committee (Alderman Bovey, who is the Mayor of the borough) stated that the present storage capacity of the reservoir was 294,300,000 gallons. The average quantity of water falling upon the watershed in the three driest years was 959 million gallons, which was sufficient to maintain a constant supply for about 90,000 persons. At present, the residents in the area of distribution were about 50,000. The average flow of water during the last fourteen years was 1144 million gallons. Last year the storage at the end of the drought was very low. The population in the distribution area was growing, and the consumption was going up in even greater ratio. These facts had led the Water Committee to determine to seek parliamentary powers to construct a third reservoir, which would increase the storage capacity by about 200 million gallons. The cost was estimated by the Engineer (Mr. W. Ingham) at £26,000. Borrowed for fifty years, such an expenditure would entail a charge for interest and redemption of a little more than £1000 a year. It was his firm belief that by the time the reservoir was constructed the revenue would be sufficient to cover the extra charge without increasing the water-rate.

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SITUATIONS VACANT.

COMPETENT MAN. Cardigan Gas-Works.
FOREMAN. Brymbo Water Company.
FOREMAN. Hinckley Gas Department.
GENERAL FOREMAN. Bromley Gas Company.
GENERAL FOREMAN. No. 3891. (Aug. 4.)
MANAGER. Portrush Gas-Works (Aug. 4.)
MANAGER (Gas, Water, and Electricity). Kendal (Aug. 6).
METER INSPECTOR AND COLLECTOR. Ilford Gas Company (Aug. 4)
OUTDOOR SUPERINTENDENT. Crystal Palace Gas Company.
OUTDOOR SUPERINTENDENT. Devonport (Aug. 25).
STOKER. Newmarket Gas-Works.
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KERN BURNERS. Cwmbran Gas Company.
PURIFIERS. Mablethorpe Gas-Works.
PURIFIERS, SCRUBBER-WASHERS, GASHOLDERS, &c. Firth Blakeley, Dewsbury.
STREET LAMPS, &c. Newmarket Gas Company.

SALE OF STOCK.

SOUTH METROPOLITAN GAS COMPANY. Tenders by Aug. 5.

MEETINGS OF COMPANIES.

CRYSTAL PALACE GAS (Aug. 15); BRENTFORD GAS (Aug. 8); BROMLEY GAS (Aug. 7); HORNSEY GAS (Aug. 15.); TOTTENHAM and EDMONTON GAS (Aug. 16).

TENDERS FOR

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SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000

	Cubic Feet Daily.
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN	1,000,000
PERNAMBUCO (Brazil)	125,000
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DULUTH, MINN. (Second Contract)	300,000

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Ripon Gas and Water Supply.—An abstract of the accounts of the City of Ripon for the year ending March 31, 1902, has just been issued by the Town Clerk (Mr. M. Kirkley). On the gas-works revenue account, the receipts from the sale of gas were £5658 14s. 3d.; from residual products, £1301 18s. 9d.; miscellaneous receipts were £75 13s. 11d.; and the balance due to the Treasurer, £4132 11s. 7d.—a total of £11,168 18s. 6d. The following are the items of expenditure: Balance due to Treasurer, £2025 2s. 4d.; cost of manufacture of gas, £6111 8s.; distribution, £415 12s. 7d.; public lamps, £238 16s. 11d.; rates, taxes, and insurance, £392 17s. 10d.; management, £382 2s. 11d.; residuals and miscellaneous, £179 11s. 7d.; sinking fund, £919 11s. 10d.; interest on loans, £385 6s. 3d.; gas reserve, £118 8s. 3d.—total, £11,168 18s. 6d. The receipts from water supply, &c., was £3179 7s. 8d.; the expenditure, £3179 7s. 8d.

Sale of Shares.—At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards sold, by instructions received from Directors and others, shares in the Hampton Court, Walton-on-Thames, High Wycombe, and Pinner Gas Companies, and the Southend Water Company. Some fully-paid £10 "B" shares in the first-named Company fetched £14 each. A few "A" shares of like nominal value in the Walton-on-Thames Company (last dividend 8 per cent.) realized prices ranging from £17 7s. 6d. to £18; some "B" shares (7 per cent.) fetching £14 5s. A new issue of 5 per cent. preference shares in the High Wycombe Gas Company were sold for £5 and £5 2s. 6d. apiece; some ordinary £5 shares of the Pinner Gas Company, carrying 7 per cent. dividend as from the 31st inst., fetched £5 10s. and £5 12s. 6d. each. A parcel of new ordinary £10 shares in the Southend Water Company, entitled to 5 per cent. dividend, was disposed of at £10 17s. 6d. and £11 per share.

The Lighting of Okehampton.—After allowing the streets to be in darkness for more than three weeks, the Okehampton Town Council have practically accepted the terms of the Gas Company for the lighting of the town. The new agreement is for five years, and gas is to be supplied at the current price, less 1d. per 1000 cubic feet for cash in one month. One of the causes of difference between the Company and the Corporation was as to the length of the term; the Corporation being unwilling to enter into a long contract, and the Company declining to accept less, in view of the fact that additional storage is found to be necessary. Objection was also taken by the Corporation to minor points in the agreement. They stipulated for the right to experiment with other illuminants in three of the lamps; but the Company, while allowing this, insisted that the period of experiment should be restricted to three months. They wish also to add words providing that the illuminant experimented with shall be of the Council's own manufacture. Considerable discussion took place in the Council last week as to whether this condition should be accepted or not. In the end, it was decided to adhere to the agreement as drafted before the insertion of this proviso, and, subject to the omission of these words, to accept the Company's tender.

West Hoathly and District Water Supply.—An inquiry was held a few days ago by Mr. O. E. Meade King, M.Inst.C.E., in regard to an application made to the Local Government Board by the East Grinstead Rural District Council, for sanction to borrow £13,000 for the supply of water to West Hoathly and Worth. The population of the latter place is 4297, and of the former 1446; and their assessable values are respectively £23,742 and £6354. The outstanding loans at Worth amount to £1650; but at West Hoathly there are none. Mr. F. S. White gave particulars of the temporary measures adopted for affording a supply of water to the various parishes comprised within the two places named, and concluded by stating that finally terms had been come to with the East Surrey Water Company. The Secretary of the Company (Mr. E. J. R. Downes) said the water would come from the Caterham Valley, the yield from the Company's wells being practically inexhaustible. The Inspector having been satisfied as to the inadequacy of the present supply, Mr. A. Stenning, J.P., who had been for three years Chairman of the West Hoathly Parish Council, objected to the part of the scheme applying to that parish, which, he said, was a straggling one. There had been no meeting called to ask the inhabitants if the scheme was wanted, which it was not; and he protested most strongly against the ratepayers being called upon to bear a proportion of the expense of supplying 31 houses. Mr. Cunliffe (for Mr. Stephenson Clarke) also objected to the scheme including West Hoathly. Mr. White, in a concluding statement, pointed out that there had been no organized opposition from West Hoathly. Mr. Stenning said he would undertake to get up a petition to present to the Local Government Board. The inquiry then closed.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

BANK HOLIDAY.

In consequence of the BANK HOLIDAY (Aug. 4), Communications for the next issue of the "JOURNAL" and Orders respecting ADVERTISEMENTS should be received at the Office NOT LATER than THE FIRST POST ON SATURDAY.

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